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THE JOURNAL OF EDUCATIONAL PSYCHOLOGY

The Translation Method of Teaching Latin[1]

W. H. Fletcher

Director of Course for Training Junior High School Teachers, State Normal School, Oshkosh, Wisconsin.

AN EXAMINATION of the curriculums of junior high schools located in different sections of the country reveals a striking similarity of purpose on the part of administrators. Generally heads of school systems recognize the important principle that with the beginning of the seventh grade there should be some opportunity for a pupil to choose for himself a part of the work which he is to pursue in school. This differentiation in most cases is slight, and is largely confined to a choice between a foreign language, more extensive work in manual training and domestic science, agriculture, and commercial subjects. The usual practice is to allow not more than one elective to a student entering the seventh grade, and in more instances such an election does not come at the beginning of work in that grade, but at a later time within that year. The bulk of the work for the seventh grade is usually the same for all curriculums.

Included within this list of electives are some of the subjects common to the traditional secondary school, such as Latin, French, agriculture, commercial work, science, history. That these have found a place within the curriculum is undoubtedly due as much to the tradition of the secondary school as to a realization of their proper significance in education and the correct placing of them upon the program. There is a variety of opinions regarding the proper placing of the beginning courses in languages, especially with reference to the question whether they shall be in the seventh grade or in the eighth. They are found placed in both. There is an increasing tendency, however, to introduce the language study at an earlier period, so that the study of a foreign language in the seventh grade is becoming more widespread.

[1]It should be explained that this method of Latin instruction originated a number of years ago in the state of New Hampshire during the time that Professor Henry C. Morrison, of the School of Education, University of Chicago, was State Superintendent of Public Instruction. The method was worked out in a limited number of secondary schools and in the years 1916 and 1917 it was subjected to a searching and critical examination by means of a series of Latin tests and an inquiry into various other factors involved in the work in Latin. The results of this investigation are printed in a monograph referred to in a footnote near the end of this article.

This introduction of a language, like Latin, at such an early period, carries with it certain difficulties which must be met in order to secure good results with children who are as immature as those usually found in seventh grade. Types of work which may be carried on successfully in tenth, eleventh, or twelfth grades, where students are more mature, cannot be carried on at all successfully in the lower grades of the secondary school. There is some agreement among educators that too great emphasis upon drill during the adolescent period is a serious mistake. It is assumed that the mental state of the child does not allow this grinding process to take effect as thoroughly as it will at a later time.

The method of approach, then, must necessarily be changed to fit the development of the pupils. They must be so taught and their mental development so considered, that the subject matter may be acquired by them thoroughly, yet with a minimum of distaste. It is fundamentally right to assume this position, because the state of development of boys and girls at the time they *begin* the study of the language is of prime importance to both teacher and pupil, but more especially to the latter. It is almost impossible to teach Latin to boys and girls of the ages of eleven to thirteen, with the maximum of success, by the methods which have so largely obtained during the past. Learning large vocabularies, committing to memory a great number of forms, learning by rote rules of syntax, such as has been the custom during the past in the ninth grade, is very well calculated to drive the pupil of the seventh grade to despair, as it has also done in the case of many pupils of ninth grade.

Probably the majority of Latin scholars, teachers, and critics would agree that the chief aim in Latin teaching is to acquire the ability to translate Latin into English. The ability to grasp the thought of the Latin author thoroughly and completely is the chief purpose of all work in translation. If the aim is to secure ability to translate, then the method is without doubt clear. From the very first lesson the class should translate a great deal of Latin. If we are to follow logically the lead of modern pedagogy, we are to learn by doing whatever we are studying, as far as that is possible. Therefore, there can be but one way to learn to translate Latin, that is, by *translating latin*. Pupils cannot learn to translate effectively and thoroughly unless they do a great deal of translating in the course of their study. They must not learn so much *about* translating; they must actually *do* the translating Even a casual

examination of the texts usually employed in teaching first year Latin will show that these books make use of a too small minimum of material for translating.

In startling contrast to the content of the elementary Latin text is the reader used in teaching reading of English to children of first grades. From the very first day of reading the children read. They read a great deal and the more they read the more they learn to read. In primary reading is applied that great basic principle of modern pedagogy, which we have mentioned above, learning by doing. Pupils who are learning to read according to the methods employed in teaching primary reading learn new words in their functional relations. Here we find them taking up each new word in its proper relation within a sentence. Now just what is meant by learning words in their functional relations? Nothing more nor less than that children shall learn to use words exactly as they will use them all their lives, in reading all sorts of printed and written pages. Children learn to read by reading and by recognizing new words as they are associated together within a sentence. They use these words to give them a complete and perfect thought. Without them the thought of the sentence is different, perhaps complete. With them, the whole light of the sentence appears.

It is this method of primary reading which forms the basis of the method of teaching beginning Latin in this article, which is the plan used in the training department of the State Normal School at Oshkosh.

From the beginning the translation of Latin into English constitutes the greater part of each class exercise. To furnish the basis of the first few sentences it is necessary to teach a few words separately. As soon as these first words are taught, not more than three in number, they are woven into a sentence. Each succeeding word is then seen for the first time by the pupils, in a sentence in which all the other words are already familiar. One word at a time is introduced to the class in this fashion, until the entire vocabulary for the day has been taught and studied in this way.

This procedure is based upon the principle analogous to that which has been indicated in a preceding paragraph, that pupils learn to translate most economically when a new word is first seen in its functional relations within the sentence. The new word occupies a place within the sentence which gives it importance. This important position makes such a definite impression upon the pupil

that the word is more easily and efficiently recalled. Very frequently the meaning of the new word is easily grasped from the context in which it stands. But even when this is not true, the new word makes a more lasting impression upon the memory of the child, because it has been used by him to get the whole meaning from the Latin sentence.

A typical first lesson is somewhat as follows: The teacher places upon the blackboard the word *puella,* pronounces it, and each child in turn pronounces it. Its meaning is then given. The same procedure is used with *bona,* then the verb, *est.* Then the sentence, *puella est bona,* is written upon the board. The class reads the sentence and gives its meaning. In this same fashion the following additional vocabulary or words similar, is taught the first day: *patria, puer, agricola, filia, filius, clarus, bonus, magnus, clara, magna, quis.* In order more easily and efficiently to secure the distinction between the gender of adjectives, *puer est magnus* is taught before *agricola est magnus.* A great many questions are asked in Latin and the answer given in English. It is a common thing in the first lesson to use between forty and fifty oral and written sentences containing the above vocabulary, or a similar one. Both declarative and interrogative sentences appear the first day. For construction, the nominative singular, agreement of the adjective with the noun, and the agreement of subject and verb are taught functionally in this first lesson.

In the second exercise, a small number of words is added to the vocabulary. The plural nominative and the plural of the verb, *est,* are aiso taught. As the vocabulary grows a greater number of sentences is possible, and each new word appears to the class for the first time, from this point on, in a sentence composed otherwise of words that are already familiar. At the close of the second exercise a quick review of all words which have been taught up to that time is secured by means of perception cards. Each word in the vocabulary, as soon as it has been taught to the class, is printed with a rubber stamping outfit, in letters about an inch high, on a plain white card. To properly display this list of words one at a time, a small box is placed upon the teacher's desk at the front of the room. On this as a support the cards are placed, face down. In the upper left hand corner of each card, upon the back, is written the word which is printed upon the other side, together with the meaning or meanings of the word which have been taught to the class. The

teacher raises each of the cards in succession to a vertical position upon the box, allows it to remain within clear view of the class for a very brief period, (not a full second of time), and then lowers the card swiftly to a place behind the box. As each card appears the class immediately gives its meaning in English. The amount of time during which the card is visible is an important consideration. In fact, it is the most important consideration in this whole process. The card must be visible the least period of time possible to secure recognition, which must be instant and accurate. This is the only reason for using such a system of perception cards in seventh grade or in any other grade in school. Without instant and accurate recognition there is no lasting benefit resulting from the use of these quick perception cards. The perception must indeed be quick, as as well as accurate, in order to secure for the child the benefits for which it is designed: that is, the *instant* and *accurate* recognition of the meaning of Latin words whenever and wherever seen.

In each succeeding lesson a few additional words are taught, seldom more than six or eight, together with one or two new constructions of syntax. The same procedure as that of the first two lessons holds for all newly taught material, whether it be vocabulary, forms, idioms, or points of syntax. Each new thing is taught in its functional relation within a sentence composed of material otherwise familiar. The names of cases, tenses, rules of syntax, are not given according to the customary classification as found in the usual beginners' Latin textbook. The emphasis is continually upon the functional bearing of each thing as it appears. This method of procedure is based upon the well-known and increasingly accepted fact that children of the age of those usually found in the seventh grade have not yet developed mentally to the point where, to them, scientific classification of grammatical terms has any value.

The distinction between verb forms to denote differences in time is taught by means of the various signs which mark these differences. Pupils soon learn that *ba* means "was" or "were"; that *bi* means "shall" or "will"; that the endings *i, isti,* etc., mean a completed action; that *era* means "had done something." It is not found necessary to teach the names of tenses in order that the class may understand the distinctions between the tenses. Neither is it necessary to teach them the rules governing the uses of tenses and cases

in order to enable them to understand these uses. This is simply another exemplification of the well known fact that art precedes science in language as well as in other studies of the curriculum.

It has been thought necessary in the past to teach a large number of words, many rules and idioms, together with complete declensions and conjugations, while at the same time an insufficient amount of Latin was being read and translated by the class to make thorough use of all this grammatical material. Very few textbooks provide enough Latin sentences to illustrate *fully* and *thoroughly* all the various points of syntax taught. Large vocabularies are found in lesson after lesson, while the words are used but once or twice and so are easily forgotten. The theory upon which the average Latin textbook seems to be constructed is that before children can translate Latin they must know all about its important forms, idioms, and grammatical construction, and must have committed to memory a large vocabulary. This all means that the *science* of the language is taught before the *art* of the language. It means further that the language sense, the feeling for sentence wholes, the grasp of thought as conveyed by whole sentences, is not considered a vital necessity. From the first this idea of developing language sense, of teaching the art of the language is subordinated to the memorizing of a great mass of material, all of it to be used at some future date, to be sure, but most of it of no immediate vital interest to children because of this very remoteness of its application. Acording to this procedure the *science* of language precedes the *art* of language, which is believed to be contrary to the best pedagogy of language study.

It is a universal fact in the history of the race that man has learned to do a great many things, including the expression of his thoughts in oral and written speech, long before he knew exactly why he did them as he did. Children learn to talk, write, play games, read and carry on all kinds of manual activities, and all this with an astonishing degre of accuracy, without ever inquiring or being in the least concerned with the question of why they do as they do. They are not at all interested in the *science* of the thing. They are, however, vitally and absorbingly interested in how to do the thing, and more than that, *in doing it*. In the same way they are most vitally concerned with getting the meaning first and learning about its structure afterward. Grammar is to them not at all necessary, because they have not yet seen its importance, nor can

they find the time or patience to so consider it at their stage of development. These are some of the things which are meant when the phrase is used above to the effect that "art precedes science in language as well as in other studies of the curriculum."

It must not be thought that because of this emphasis upon the art side of Latin study and because there are no labels placed upon cases, tenses, idioms, and constructions, that these are not well taught. Each new idea, form, idiom, construction, as soon as it appears in a sentence, is explained and the same thing appears a sufficient number of times in succeeding lessons to secure its fixation. In addition, each form, idiom, tense, and construction appears in a test given subsequently to determine whether it has been securely fixed in the minds of the pupils.

This emphasis upon the *art* side of language study does not mean that the teaching is of a weak and flabby variety. Probably there is no method of presenting a subject to a class that calls for more concentrated effort on the part of the teacher than just this method that is being described. In the first place this method calls for the collection of a great deal of material that is fitted to the age of the pupil being taught. Then, this material has to be so organized and so presented that every bit of the class exercise is alive for every member of the class. There can be no sleepy moments during the period. An alert teacher and an alert class produces a quality of work that far exceeds the quality possible under the average method. And all the time the translation of Latin is the means employed to teach everything new about the language. Endings have a significance to the pupil because they are shown to have differences in meaning from the ways they are used in each succeeding sentence. Children learn this fact faster for themselves than a teacher could possibly teach it to them because they use both eyes and minds with considerable rapidity. Idioms take on a peculiar significance, because they appear for the first time in an important relation to the other parts of the sentence. This relation is functional, and, therefore, vital.

It is to be noted, further, that some of the leading educational authorities consider it very poor practice to teach formal grammar during the junior high school period. This attitude applies especially to the teaching of formal English grammar, since it has been found that extended and exhaustive study of formal grammar is practically barren of results during this stage of development. Upon this

same ground rests the theory that formal grammar in teaching Latin to junior high school pupils has no place. Thus far this theory proves to be working and workable, because it is now known after several years experimenting, that Latin can be successfully taught to children of seventh grade, without any emphasis upon this side of language study.

To secure interest and to acquaint the class with the fact that Latin has a very broad place in our present civilization several devices are in use. English words derived from Latin are noted from the beginning, a device which has formed an important part of some beginners' texts, and has been used by very many teachers of Latin. The use of Latin words upon coins, state seals, mottoes of graduating classes, and upon trade marks of various well known articles offered for sale, are all called to the attention of the pupils. Latin songs are introduced very clearly and sung with a great deal of pleasure. Among these are the following: America, Gaudeamus Igitur, Flevit Lepus Parvulus, Yankee Doodle.

As soon as possible there are introduced into the teaching short stories, simple in structure and with an interesting theme. Those which are being used at present comprise a series descriptive of the legendary origin of the name of the Latins, the rise of Rome and the Romans, with their kings, temples, religion, games, social customs and various facts of natural interest to children. The first part of the series has to do with the adventures of Aeneas in escaping from Troy, his wandering on the sea, in Africa and in Italy. Each story develops a special vocabulary, emphasizes idioms, constructions and forms already taught, and uses a minimum of new words or words which will be used infrequently in the later work of the class.

To keep an accurate account of the progress of the class from week to week frequent short tests are given in vocabulary and translation of sentences. Whatever forms, constructions, idioms these tests show are unfamiliar to the class receive attention in subsequent lessons and those weak spots which are discovered by the test method are quickly covered. Graphs of these tests are made and the progress of the class is more readily apparent. From a study of these graphs it is apparent that the class rapidly gains in ability to translate and accurately recall vocabulary. Any words which these tests show have not become firmly fixed in the minds of the class are retained in the card list for rapid oral drill and are

also made the basis of further study in sentences. Subsequent tests using these same words enable the teacher to decide whether the class has finally learned to recall this list of apparently difficult words.

By the method which has been described at some length a considerable vocabulary is gradually acquired. The list of words is made up chiefly from those used in Caesar, because the first extended reading done by the class is from a text, "Fabulae Faciles," which employs a Caesar vocabulary. Of the total vocabulary of "Perseus," the first story of the "Fabulae," there are over 250 words from Caesar which Lodge prints in his selected list of 2,000 words from classical authors usually read. Not all of these 250 words are taught intensively, however.

Nutting's "First Latin Reader" is also used as reading material the first year. While this book contains many words not found in any of the classical authors commonly read, the material furnishes no great difficulty on this account, because those words which are not needed for further use are not taught intensively, nor placed upon the perception cards for quick visual review, but are told to the class and then immediately forgotten by the majority of the class. This same statement would be true of any author read. The economy of this method is very apparent at this point. Nothing in vocabulary is learned which will not be used a great deal in subsequent reading. Nothing is drilled which is not to be used continually. Words of rare occurrence consume only enough of the time of the class to fill out the meaning of sentences. They are then passed over as they should be.

The total number of words taught the class through detached sentences, short paragraph stories, and connected reading from texts is at least 500 words for the first year. Each of these words has become the permanent property of the class, not by sheer rote memory, but by associative memory, a better type. Each word has been learned through its relation to other words within a sentence. This close association from day to day between words known and unknown surely accomplishes the desired result: a good vocabulary, thoroughly well in mind, and instantly available. The importance of this single achievement of first year Latin in seventh grade cannot be overestimated. Probably Latin teachers the country over would agree that the greatest single obstacle to success in Latin translation is unfamiliarity with an extended Latin vocabulary. A

student may be perfectly familiar with the meanings of endings, tense signs, and constructions, may know idioms thoroughly, and yet fail to translate Latin well because his vocabulary is imperfectly acquired.

Whenever a new author or a new text is to be studied, the lessons of a few days immediately preceding are devoted to acquiring an acquaintaince with the initial vocabulary of the new author. Sentences containing the new vocabulary are used in the class, and idioms and constructions peculiar to the new material also appear in these sentences. The new vocabulary is immediately placed upon perception cards and the class rapidly acquires the new words. The result of this procedure is that the first paragraphs read from the text are mastered without great difficulty and the class is greatly encouraged to continue. The feeling that they can translate Latin is a wonderful incentive to further translation.

Another interesting phase of the first year work is dramatization. This takes the form of simple dialogue in Latin, using the vocabulary already acquired, with such other new words as the story may need to enable it to run smoothly. First, the class decides upon the simple story it shall dramatize. The cast of characters is drawn and placed upon the board. Following this the simple story is written in English, the whole class making suggestions and criticising the form. When this English version is completed, the class then turns the story into a Latin dialogue. Each sentence is worked out on the board, the class directing, the teacher assisting at those points at which the class needs help. The Latin version is subjected to careful criticism and finally is made to suit the class. The teacher suggests such corrections as she deems necessary, and the class amends its work.

When the final draft of the dramatization is completed the class procures its own costumes and properties and presents the simple play before a group of pupils of the school, or before some other audience.

The pedagogy of the dramatization device is this: by means of the Latin dialogue the first and second persons of verbs and pronouns are more easily and effectively taught to children of this age than by any other means. In cases in which the first and second persons of verbs and pronouns are actually used in the class to dramatize an incident with which the class is already familiar, the value of these forms is very apparent. The impression thus

made is deeper than that made by the average means, such as reading, writing or committing to memory by rote. The most lasting impressions in Latin are those which are produced by situations which are themselves brimful of interest and keenly alive, from the standpoint of the child.

Dramatization also furnishes the most vital form of Latin composition, if composition is to be taught at all in this year, at least the written form of composition. It is true that a great deal of simple oral composition is very helpful and stimulating, but it is to be doubted whether any amount of formal written composition is at all necessary or even desirable. Probably more good results from translating a great deal of Latin than comes from less translation mingled with some written composition.

By the end of the first year the seventh grade pupil should have acquired a vocabulary of approximately 500 words of the Caesar vocabulary, besides a thorough working knowledge of the forms of the five declensions, a great many of the commonest idioms, forms of the verb, active and passive, in common use, and a list of about thirty of the most common constructions of Latin grammar. None of these things which are so commonly understood to be classified as Latin grammar has been labeled with its customary Latin name. It has not been taught in that fashion. The class will have read hundreds of simple sentences illustrating all sorts of things in the above list. They will have read between fifteen and twenty short stories, at least two of the "Fabulae Faciles," and some of Nutting's "First Latin Reader." They will be familiar with several Latin songs, a great number of English words derived from Latin, mottoes from Latin, and some other applied material. The main object of the course will have been attained: the children will have translated a great deal of Latin, carefully graded to agree with their development and of a content that is alike interesting and worth while.

With the second year Caesar is begun. Exactly the same method of approach is used as with previous material used for reading, except that a great deal of the vocabulary does not need to be taught because it has already been learned in the reading of the Fabulae Faciles. By using the method of teaching new idioms, phrases, constructions of syntax which was a part of the first year work it is possible to teach these better, because they are to be used immediately in translating the author. It is more economical to

teach the idioms, phrases, forms and constructions peculiar to an author at the time when they are to be used in reading, than to attempt to teach them in one year, expecting them to be efficiently recalled at a later date.

Since a great deal of the work of this year is under the direct supervision and guidance of the teacher, with the pupils working out the new subject matter for the first time in the class, a great deal of the waste which arises from wrong methods of study is avoided. Students are taught to use the vocabulary correctly, to treat whole thoughts, instead of single words, and are gradually led to acquire a maximum speed and accuracy impossible without the guidance of the instructor.

An increasing amount of oral composition based upon the reading from day to day, is a part of the regular program. An occasional written lesson in composition is attempted, but for the most part the dramatization furnishes the more vital composition and the kind that is more important.

The work with perception cards is continued, and those cards which tests show have been mastered, are dropped from the list. They may appear again, however, if any number of the class shows either by its written or oral work that some of the older words are unfamiliar. They may even appear again in sentences upon the board to be taught again in new relationships, following which they will be shown to the class by means of the perception cards for further fixation.

Sentence tests and vocabulary tests are an important part of the second year's work, because they show accurately the words that are not yet acquired and the constructions which need further emphasis. They measure the progress of the class. The work of preparing and correcting these tests is not burdensome and is worth all that it costs because it furnishes a correct diagnosis of the needs of the individual pupils. Further, it diminishes the liability of guesswork on the part of the teacher as to whether the pupils have accomplished what was aimed at in the beginning. Satisfactory tests can be had from several sources or they can be devised by any competent teacher, without great difficulty. Without such tests, the results of the teaching are hazy and some pupils are quite liable to suffer because their wants are not attended to in season and they thereby become more liable to fall behind or even

drop out of the class. If the class can see the graph of its own progress from week to week, it will make a more serious effort to better its own record.

Optional home study is introduced during the eighth year for those students who wish to become better acquainted with Latin. This home work consists entirely of reading from some text not used in the class exercise, or in some portion of the text used in class which will not be read in the class period. There is considerable material of this sort available in such books as "Gradatim," Post's "Latin at Sight," Gallup's "Latin Reader," and several other similar collections of material which is not too difficult for pupils to attempt in the second year of their study. It is essential to the success of this home study that pupils carry on this work without help from any one except the class teacher. This will be readily understood when the great difference is noted between the method of conducting the entire course, from the method generally employed with beginning classes in Latin. No outside influence should interfere with the work the teacher is trying to accomplish in a radically new way of studying the ancient language.

In the ninth year Cicero is read and the work in oral and written composition is based upon Cicero. There is no essential change in method from that used in seventh and eighth grades. Until about the middle of this year, there is no place on the program for any study of formal Latin grammar, and there is no extended drill on forms, either of declensions or conjugations. There is no set of grammatical rules committed to memory. The oral and written composition is of the same type as that of the preceding years, mainly class work, group effort to do correct Latin prose. Constantly throughout this ninth year there is daily practice in recognition of forms, both of verbs, nouns and pronouns, and increasing acquaintance with the important applications of syntax as they have been found to occur in the authors commonly read in the secondary school. "The Syntax of High School Latin," edited by Lee Byrne, is the basis of the choice of syntax to be covered in these years.

During the last half of this ninth year, however, a rapid and thorough study of Latin grammar is carried out. The background of two and a-half years of reading, combined with recognition of the variety of uses of various forms and combinations of forms, makes this grammatical summary more effective. The scientific

classification of grammar is now possible and it takes on meaning, because the child has experienced the uses of grammar and the necessity of understanding correct grammatical structure. Such a procedure is undoubtedly justified on the ground that it makes use of the principle, previously stated, that in no study can the science of that study be understood or appreciated fully until there is a large acquaintance with the art side of the study. Facts invariably precede the laws governing the facts in the experience of mankind. Rules are developed after a great deal of experimenting with processes. Formulas always succeed actions. Just as in the study of science the meaning of a scientific principle is made clearer by examining a concrete application within the experience of the learner, so in the study of the languages, grammar is more effectively studied and more deeply appreciated when it follows a large acquaintance with language. By this method of studying Latin, the pupils have secured a large acquaintance with the language as it is actually used. From this acquaintance the grammatical classifications are rapidly gained.

What are the results of this method? First, the interest of the class is maintained at the highest pitch, the pupils like to translate Latin, they like to study Latin. That this is true is demonstrated by the fact that nearly all the members of the class repeatedly ask to be allowed to read in their Latin readers outside of the class period.

A surer test than this has been made of the value of this method, and the complete results have been published in an extended monograph* on the subject of Latin teaching and ability in Latin. In this monograph particular attention is called to the following facts: the translation method requires less time on the part of the students, than the old-time grammar method; this saving of time averages slightly over one hundred minutes per week, covering the entire period for which Latin is studied. This single factor of economy of time would greatly justify the use of such a method. By a careful comparison between the results obtained by testing students in school where the grammatical method was employed with the results obtained in schools where the translation method was in use it was found that the students employing the latter method did equally good work in translating Latin. These same tests further

*See Brown, H. A. A Study of Ability in Latin in Secondary Schools. Published at State Normal School, Oshkosh, Wisconsin.

revealed that students who had been trained by the translation method, with a minimum of work in grammar, were able to do equally good work in the tests in grammar. It, therefore, appears reasonable that a method of studying Latin which secures the interest of the pupils, economizes their time, enables them to read with as great facility as by any other method, and fits them to understand the grammar of the language as thoroughly, is vastly superior as a means of studying Latin.

The Psychology of Riddle Solution: An Experiment in Purposive Thinking

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Introduction.

THE use of riddles as material for an objective study of purposive thinking, or reasoning in its simpler form, occurred to the writer when he was endeavoring to make clear to his classes in psychology the similarity and possible identity which is brought out on a comparison of the method used in this process and the method used in learning by trial and error. Class demonstrations with riddles were later conducted but with no effort immediately directed at standardization of conditions. Out of this grew the present experiment.

In Ladd and Woodworth's *Physiological Psychology*, page 606, we find this statement: "All of these performances, even the most intellectual (perception, analysis, and abstraction, comparison and reasoning) though they differ greatly in content, preserve the method of procedure that was visible in learning by trial and error."

In Thorndike's *Elements of Psychology*, page 265, we have: "This process of attentive consideration and selection or rejection is clearly shown in the search for a proper word to express a meaning, in attempts to solve problems of all sorts from the simplest *riddle* or puzzle to the most abstruse question in mathematics or science and in summoning evidence to support an argument."

While the results of the present experiment may not go very far toward substantiating these statements experimentally, they are presented because the handling of these data makes evident certain tendencies pertinent to the solution of the problem.

This study bears a relation to Ruger's work with puzzles[1] in that both demonstrate the use of the method of trial and error in solving problems. In one case the elements are largely physical and in the other, the solution of riddles, the elements are mental.

It will become apparent, as one follows this experiment, that the results bear out Dewey in his conclusion that "Too few suggestions ...icate a dry and meagre mental habit * * * * On the other hand,

[1] ...*chology of Efficiency. Archives of psychology, 1910.*

suggestions may be too numerous and too varied for the best interests of the mental habit. So many suggestions may rise that the person is at a loss to select among them * * * * The best mental habit involves a balance between paucity and redundancy of suggestions."[2]

The use of frequency tables as found in the experiment suggests the frequency tables of Kent and Rosamoff in *A Study of Association in Insanity,* from which some help was obtained.

SUBJECTS.

The subjects of this experiment were three hundred and thirty-one young men and women of normal school and college grade with a few high school students, all from representative schools and colleges in the States of Virginia, Iowa and Texas. Most of them were young women. More than these took part in the experiment but because the individuals included in this surplus knew one or more of the riddles their records were discarded. This frequent previous knowledge of any riddle by a subject made the obtaining of sufficient data a slow process.

MATERIALS USED IN THE EXPERIMENT.

From a large assortment of riddles of more or less value as material for such an experiment, ten such were selected because of their seeming fairness as mental problems. "C'est qui'il faut distinguer entre les énigmes de mots et les énigmes de choses" was a caution observed at the very beginning. Also those riddles which are capable of only one answer would seem to be best for the purpose in hand. However, ten such could not be found and so besides a few of the most desirable others almost as good were selected. After such a search one concludes that really good and fair riddles are rare and that riddle solution to-day and in recent years cannot be a serious occupation, but must be more of the nature of a diversion with the odds in favor of the propounder of the riddles. This is no denial of the statement of Gaston Paris in his preface to Eugene Rolland's *Devinettes ou Enigmes Populairies de la France,* which is: "Legout des énigmes, des devinettes, pour employer le vrai mot francais, est, comme on sait, de toute antiquité, et se retrouvé chez les peuples les plus divers * * * * qui a joue, a certaines epoques, un role important dans la religion, dans la philosophie, voire dans la politique."

[2] JOHN DEWEY. *How We Think.* Page 36.

The following riddles were printed on small cards and arranged according to number in small packs of ten:

Riddle No. 1:

If your aunt's sister is not your aunt, then what kin is she to you?

Riddle No. 2:

Use me well and I'm everybody. Scratch my back and I'm nobody. What is it?

Riddle No. 3:

What goes up hill and down hill and yet stands still?

Riddle No. 4:

What is bought by the yard and worn by the foot?

Riddle No. 5:

Always runs and never walks. Has a tongue and never talks. What is it?

Riddle No. 6:

What is it that asks no questions yet requires to be answered many times?

Riddle No. 7:

The more you take away from it the larger it gets. What is it?

Riddle No. 8:

What has neither flesh nor bone yet has four fingers and one thumb?

Riddle No. 9:

What is full of holes and yet will hold water?

Riddle No. 10:

The man who made it wanted to sell it. The man who bought it never used it. The man who used it never saw it.

ADMINISTRATION OF THE EXPERIMENT.

The following instructions were carried out by those giving the experiment:

1. The student at his desk is given a set of ten riddles arranged in order and a blank sheet with pencil. He fills out his blank and is instructed not to look at the riddles until the experimenter has given the signal to start.

2. The experimenter calls: "Riddle Number One, Go," and starts a stop watch, allowing the subjects to write all the guesses that come into his mind whether he thinks them right or not.

(The subject has been encouraged to write his guesses down and not to let them pass unrecorded. He should record both right

and wrong guesses. This encouragement is given before the experiment begins and nothing more is said to the subject by the experimenter, except "Riddle Number * * * Go," and at the end of three minutes "Stop.")

3. This is continued until the ten riddles have been tried. After the experiment has been finished the subject fills in blanks calling for total number of guesses for each riddle, on the side, and total number of guesses for all riddles at top of blank.

4. The answers to the riddles are now given and the subject checks off all correct solutions, totals them and puts the total in the blank for number of solutions at the top.

5. In case subject has heard the riddle before and remembers the answer, he is instructed to write in: "I have heard it before," and to record the answer.

6. The blanks are then collected.

Herewith is given a sample record—

Total guesses, 18; Subject Number, 234; Total riddles solved, 4; Date, March 8, 1918.

	NO. OF GUESSES		NO. OF GUESSES
Riddle 1:		Riddle 6:	
First guess, *Mother** ..	1	1st guess, 'phone, ...	..
Riddle 2:		2d guess, cat, ...	..
1st guess, Match	1	3d guess, *doorbell,*	3
Riddle 3:		Riddle 7:	
1st guess: Yellow of an egg	1	1st guess, blues, ...	..
2d guess, churn dasher,	2	2d guess, baby, ...	2
Riddle 4:		Riddle 8:	
1st guess, shoe, ...	..	1st guess, fork, ...	1
2d guess, stocking, ...	..	Riddle 9:	
3d guess, leather, ...	3	1st guess, air, ...	1
Riddle 5:		Riddle 10:	
1st guess, *wagon,*	1	1st guess, *coffin,*	..
		2d guess, shroud, ...	2

* The italicized guesses were acceptable.

THE ANSWERS TO THE RIDDLES.

The following responses were arbitrarily taken as the correct answers to the riddles in the absence of experimentally determined answers:*

RIDDLE	ANSWER	RIDDLE	ANSWER
1	Mother.	6	Doorbell.
2	Mirror or looking glass.	7	A hole or ditch.
3	Road, path or trail.	8	A glove.
4	Carpet, matting or rug.	9	A sponge.
5	A wagon.	10	A coffin or casket.

TABULATION OF RESULTS.

Upon an examination of the blanks on which were recorded the guesses or trials at the several riddles it was found, as was expected, that some of the subjects made numerous guesses at a single riddle and some made either one guess or none. These guesses were taken as objective evidence of a centrally performed process. Unfortunately many associations aroused by reading the riddles probably were lost to the experiment because of the subject's failure to record them. However, this was unavoidable.

The total number of trials and the total number of correct solutions for the ten riddles for each individual having been ascertained, a tabulation of these data for all the individuals was made in which the total number of guesses of an individual was placed first and opposite it was placed his total number of solutions. But in the tabulation the least speedy guessers come at the top of the column, or series, and the most rapid guessers are at the bottom, that is they end up the series, the order reading from least to most guesses throughout. This gave two columns, one for trials, or guesses, and one for successes.

INTROSPECTION

In order to introduce the reader to the trial and error character of the method used by subjects performing riddle solutions a few introspections of the best students, those of more mature mind,

(It was hoped that the number of cases would determine to some extent the correct answers, or justify the ones artibrarily taken, but this was met with disappointment excepting in case of a few of the riddles.

are given below. While these should not be taken as a necessary part of the experiment, they are offered as subjective evidence before beginning the more serious objective treatment.

Introspection Obtained from Riddle I.

Subject 332: By thinking of whole family of aunts and different conditions.

Subject 333: I began at first to feel after some unusual relationship and a vague notion of my mother's stepsister came, and then the solution which completely satisfied.

Subject 334: I thought of myself as my niece's aunt and got conclusion from that cue.

Subject 335: I solved by running through my family of aunts and the only one not my aunt was my mother.

Subject 336: First thought of general relation of aunt; cause of relation: concrete thought of a particular aunt, my mother's sister; realization that my aunt's sister is not my aunt but my mother. Doubt as to whether this is true in all cases; idea that it is not true in all cases.

Introspections Obtained from Riddle II.

Subject 332: Started thinking of things having backs. Then thought of things with a back which scratching changed: match, chair, book, mirror.

Subject 333: The expression "scratch my back" suggested match-strikers I have seen. Then my thought turned to a different kind of meaning and I tried to find a word that by crossing a "t" at the end would fit. I didn't find it but the words "one," "all" and crowd" presented themselves.

Subject 334: "Scratch my back" attracted my attention. Match-scratcher flashed into my mind and was instantly rejected. "Scratch" still held the focus of attention. Door-mat came as the result. Rejected as before. I am unable to find the association that caused public opinion unless it be everybody.

Subject 335: I said to myself: "This must be a word—the word "all." Can I make a "k" out of some letter of this word and make nobody? No, I suspect it is not a word, but maybe a match. Or could it be a pig? It is flesh. It lies down like a log. Not certain."

The Frequency Tables

The frequency tables for the several riddles show the number of subjects making any single guess or trial. By way of illustration, in Riddle I the associate "aunt" appears 28 times, "a red ant" is given once and "mother" 227 times. In the frequency table for Riddle II which proved to be the most difficult riddle of the ten, "book," or "a good book" has a frequency of 24, "chicken" has 1, "greenback" has 2, "cat," or "a black cat" a frequency of 31. The so-called correct answer, "looking-glass," or "mirror" has a frequency of 53 while the associate "match" occurs 93 times. In order to economize space all those guesses with a frequency of less than 5 have been omitted from specific mention. They are grouped together under "Miscellaneous."

TABLE I

Riddle I

Guess	*Frequency*	*Guess*	*Frequency*	*Guess*	*Frequency*
aunt,	28	no kin,	44	step aunt,	7
aunt-in-law,	9	not any kin,	26	Miscellaneous, (29 guesses, each with a frequency of less than five),	48
aunt by marriage,	9	none,	50		
cousin,	24	sister-in-law,	15		
friend, a	5	step mother,	6	Total,	503
mother,	227	sister,	5		

TABLE II

Riddle II

Guess	*Frequency*	*Guess*	*Frequency*	*Guess*	*Frequency*
book, or a good book,	24	money, or dollar,	14	watch,	6
cat, or a black cat,	31	match box,	7	writing tablet, or stationery,	8
check,	8	match scratcher,	18	Miscellaneous, (100 guesses, each with a frequency of less than five),	137
dog,	11	paper,	5		
friend, friends,	10	pig,	7		
looking glass, or mirror,	53	pen, or fountain pen,	5	Total,	460
match,	93	reputation,	5		
		sandpaper,	5		

TABLE III

Riddle III

Guess	*Frequency*	*Guess*	*Frequency*	*Guess*	*Frequency*
air, or atmosphere,	11	smoke,	5	time,	5
fence,	23	sun, sunbeam, sunlight, or sunshine,	47	water,	37
grass,	30	shadow,	12	wind,	18
man,	6	soil,	5	wagon or wagon bed,	9
light,	6	stream, or brook,	5	windmill,	5
road (148), or path,	193	sidewalk, walk,	6	Miscellaneous, (100 guesses, each with a frequency of less than five),	172
railroad,	6	trees, forest, or wood,	18		
riding (1), or man in car or man in wagon,	8	track, or tracks,	13	Total,	668
river,	11	trail,	5		

TABLE IV

RIDDLE IV

Guess	*Frequency*
bandage cloth,	5
carpet,	119
cotton,	12
cloth,	16
dress,	14
floor, or flooring,	8
hose, stockings,	70
leather,	87
lumber,	6
land,	12
linoleum,	6
matting,	20
pavement, sidewalk.	5
ribbon,	10
rug,	17
shoe,	28
silk,	9
shoestrings, or laces,	38
shoe leather,	5
socks,	5
thread,	19
wool,	7
yarn,	29
Miscellaneous, (57 guesses, each with a frequency of less than five),	84
Total,	633

TABLE V

RIDDLE V

Guess	*Frequency*
buggy,	46
clock,	43
carriage,	8
cart,	6
dog,	13
fire,	5
grains,	26
lizard,	10
rabbit,	5
river,	23
snail,	11
snake,	16
shoe,	59
wagon,	254
watch,	17
water,	8
Miscellaneous, (60 guesses, each with a frequency of less than five),	85
Total,	635

TABLE VI

RIDDLE VI

Guess	*Frequency*
baby, or infant,	37
books,	7
bill,	12
clock,	18
call,	5
conscience,	24
dog,	11
doorbell,	106
door,	6
horse,	9
hunger,	7
letter,	20
nature,	5
problems,	7
telephone,	190
time,	7
thirst,	6
Miscellaneous, (94 guesses, each with a frequency of less than five),	138
Total,	616

RIDDLE VII

TABLE VII

Guess	*Frequency*
air,	11
book, or books,	6
common fractions,	6
ditch,	27
five,	5
hole in ground,	119
knowledge,	9
river,	12
lake,	7
well,	26
yeast,	5
water,	5
zero,	5
Miscellaneous, (116 guesses, each with a frequency of less than five),	163
Total,	442

TABLE VIII

RIDDLE VIII

Guess	*Frequency*	*Guess*	*Frequency*	*Guess*	*Frequency*
cradle (wheat), ...	14	glove, ...	134	guesses, each with a frequency of less than five), ...	104
clock, ...	10	pitch fork, ...	9		
chair, ...	6	rake, ...	6	Total, ...	340
drawn hand, ...	5	skeleton, ...	7		
doll, ...	13	statue, ...	25		
fork, ...	8	Miscellaneous, (74			

TABLE IX

RIDDLE IX

Guess	*Frequency*	*Guess*	*Frequency*	*Guess*	*Frequency*
air, ...	22	ocean, ...	17	tea kettle, ...	8
body, ...	7	pond, ...	8	well, ...	28
clouds, ...	19	river, ...	34	Miscellaneous, (77 guesses, each with a frequency of less than five), ...	115
creek, ...	21	sponge, ...	110		
cloth, ...	16	spring, ...	11		
earth, ...	38	sprinkler, ...	16		
ground, ...	33	soil, ...	10		
lake, ...	13	sea, ...	8	Total, ...	546
mouth, ...	5	sifter, or sieve, ...	6		

TABLE X

RIDDLE X

Guess	*Frequency*	*Guess*	*Frequency*	*Guess*	*Frequency*
air, ...	13	gas, ...	5	Miscellaneous, (111 guesses, each with a frequency of less than five), ...	158
bald head, ...	11	patent right, or patent, ...	12		
coffin, or casket, ...	68	time, ...	5		
electricity, ...	19			Total, ...	296

GROUP GUESSING

Table XI shows for each riddle the number of subjects (a) attempting the riddle, (b) the number solving it, (c) the number failing to solve the riddle, (d) the number failing to record a response, and (e) the total number of guesses for that riddle. To understand the significance of the data given in the last column (e) it must be borne in mind that some subjects guessed three and some four guesses, occasionally to a riddle. Column (f) contains number of different guesses given to any riddle.

This tabulation enables us to determine the most difficult riddle and the easiest one. To ascertain the difficulty of a riddle the per cent of subjects failing to solve it is found. Hence, the number in

(c) for every riddle is divided by the total number of subjects participating in the experiment, *i. e.* 331. Those failing to respond are included in the number of failures as well as those who tried and failed.

TABLE XI

Showing Group Guessing.

	Number of Subjects.				Total Guesses.	Number of Different Guesses.
	(a)	(b)	(c)	(d)	(e)	(f)
Riddle I	324	226	105	7	503	44
Riddle II	272	53	278	59	460	121
Riddle III	323	169	162	8	668	126
Riddle IV	318	134	197	13	633	82
Riddle V	325	254	77	6	635	76
Riddle VI	315	106	225	16	616	111
Riddle VII	278	119	212	53	442	134
Riddle VIII	267	134	197	64	340	85
Riddle IX	315	110	221	16	546	96
Riddle X	199	68	263	132	296	118

TABLE XII

Showing Riddles Arranged in Order of Difficulty

(Beginning with easiest which is RiddleV.)

Rank 1. Riddle V 23.1% of failures.
2. Riddle I 31.5% of failures.
3. Riddle III 48.7% of failures.
4. Riddle IV 59.5% of failures.
4. Riddle VIII 59.5% of failures.
5. Riddle VII 63.7% of failures.
6. Riddle IX 66.4% of failures.
7. Riddle VI 67.7% of failures.
8. Riddle X 79.1% of failures.
9. Riddle II 83.6% of failures.

TABLE XIII

Showing per cent. of unusual guesses and average frequency for each riddle after eliminating the frequency of correct guesses.

Riddle.	Number of guesses occurring once.	Percentage of total.	Average Percentage.	No. oc. twice.	Percentage of total.		Average frequency.	Average preceding.
(Least difficult) V	44	6.9		13	2.0		5.1	
I	19	3.7		8	1.5		6.3	
III	58	8.6—	6.4	21	3.1—	2.2	3.9—	5.1
IV	42	6.6		7	1.1		6.9	
VIII	57	16.6		8	2.3		2.5	
VII	83	18.7—	13.9	20	4.5—	2.6	2.4—	3.9
IX	50	9.1		20	3.6		4.5	
VI	66	10.7		16	2.6		4.5	
X	79	26.7—	15.5	21	7.1—	4.4	1.9—	3.6
(Most difficult) II	73	15.9	15.9	20	4.3	4.3	3.3—	3.3

(Table XIII should be read thus: In Riddle V there were forty-four guesses having a frequency of one and these composed 6.9% of the total guesses in that riddle; moreover there were thirteen guesses having a frequency of two and these were 2% of the total guesses. But the average frequency for all the different guesses in that riddle after eliminating the frequency of the correct guess was five and one-tenth.)

The Difficulty of the Riddles

Table XII gives the riddles arranged in the order of their difficulty.

It will be seen from Table XII that the smallest per cent of failures (23.1%) for the group occurred in the effort to solve Riddle V. Hence it is the least difficult riddle of the ten. It will also be seen that Riddle I is somewhat harder, that Riddles IV and VIII are of equal difficulty since they have the same per cent of failures, and that the hardest riddle is Riddle II, for 83.6% of the group failed to solve it. This last riddle is preceded by Riddle X which is almost as difficult.

It might be objected that fatigue entered into the experiment and could account for the falling away in Riddle X since it was the last problem in the series, but this does not account for the extreme difficulty of Riddle II which was the second one given. And, besides, though it is true that 132 subjects failed to record a guess for Riddle X, only 16 subjects failed to record a guess for Riddle IX which preceded it by just about three minutes. From these considerations we cannot say that fatigue caused the falling away in Riddle X. The writer believes this was caused by the extreme difficulty of the situation, or strangeness of the problem.

The Influence of Difficulty on Group Guessing

According to our use of the word difficulty, as indicated above, the more difficult the riddle, the smaller are the chances of its solution by the group. But what effect does difficulty have on the association process of the group if we limit the problem to those associations which do not include the correct guess? The writer does not undertake to answer this question, but only to show certain tendencies which seem to obtain in this data.

We turn now to examine guesses other than the correct ones, as given in the Tables I to X. There were forty-three different guesses given for Riddle I besides the correct guess, mother or

its synonym. Nineteen of these were given only once. "Aunt" was given by twenty-eight subjects, "cousin" was given by twenty-three, "sister-in-law" has a frequency of fifteen. For Riddle II there were 121 different guesses made by the subjects. Of the group there were ninety-three who guessed "match," some stopping at that and some, who were dissatisfied with the guess, going on and giving other guesses. Twenty-four guessed "book" or "books." Thirty-one guessed "cat" or "black cat." Eighteen guessed "match scratcher." But seventy-three made guesses which were made by them only. These are rare or unusual associations. We may, for want of a better term, call this unusualness of the first degree. Where a guess was given twice, or by two individuals out of the three hundred and thirty-one, we may call it an unusual guess of the second degree. A guess which has a high frequency would be a very common guess.

The problem now for consideration is to find how difficulty operated on usualness of guessing. We shall examine the data both from the standpoint of usualness, or commonness and that of unusualness. Let us assume that the problem has a two-fold character, *i. e.* (a) What effect does difficulty have on guessing with respect to unusualness of first and second degree? (b) What effect does it have on usualness or commonness of association?

(a) For Riddle V 6.9% of the guesses were of an unusualness of the first degree and 2.3% of them were of unusualness of the second degree; while for Riddle II 15.5% of the guesses were of the first degree of unusualness and 4.3% were of the second degree. We have here examined the least difficult and the most difficult riddles in this respect and find a decided difference between them on this score of unusualness, especially in that of the first degree. The guesses are more unusual in the more difficult riddle.

When we examine the data (see Table XIII) for unusualness of first and second degree in connection with difficulty of riddles as shown in the table mentioned above we find that the data as given does not show a regular increase from riddle to riddle as we proceed from easiest to hardest, but that there are some fluctuations in certain riddles. However, if we combine our data into groups of three and find the average for the group, these groups do show a tendency to increase in unusualness, or rareness, of guesses as the difficulty increases though the case is not so clear in that of the second degree. An examination and comparison of the averages for the groups make this apparent.

(b) As to the effect of difficulty on homogeneity or usualness of guesses an examination of the combined material indicates a tendency for usualness, or average of the frequencies (after eliminating the frequency of correct associations), to decrease. The first group averages 5.1, the second 3.9, the third group 3.6 and the last riddle shows 3.3 alone.

The facts for (a) and (b) are well represented by the following where the average of the respective items of the first three riddles serves as a basis for ratios:

Unusualness of	Easiest three riddles	Next three	Next three	Most difficult
1st degree	100	216	242	248
2nd degree	100	118	200	195
Usualness or Average frequency	100	66	60	56

Conclusion: The above handling of the data justifies the inference that within the limits of these data there is a tendency for associations to be somewhat more homogeneous in easy riddles than in the hard ones and for rare or unusual associations to be less frequent in the easy riddles but more frequent in the more difficult riddles.

Trial and Success

Table XIV presents in abbreviated form the most striking objective facts of the experiment. This is a condensed statement of a more detailed tabulation which is rather too extensive to be given here. The original tabulation was composed of the number of trials, or guesses, for all the ten riddles and likewise of the solutions, for each subject. This was regarded as an array of objective evidence obtained during the performance of the mental process of solving riddles. But this original tabulation was too expanded to show very definitely decided tendencies, hence its condensation.

With the facts of Table XIV before us we may ask ourselves the question: What has guessing to do with solving riddles in this data? In general one might suppose that the more one guesses the more likely he is to succeed and in that case the correct solutions ought to increase with the amount of guesses. That is, total guesses should correlate positively with solutions. But this is not borne out by the data as afforded in the above-mentioned table.

TABLE XIV

Distribution of Guesses with Average Number of Solutions for each Number.

Frequency	*Number of Guesses*	*Average No. of Solutions*	
1	5	0.0	0
8	6	2.8	
9	7	3.1	
14	8	3.3	
12	9	3.4	
19	10	4.5	3.4
24	11	4.3	
26	12	4.2	
31	13	4.3	
23	14	5.2	
19	15	5.1	4.6
24	16	4.1	
25	17	4.6	
13	18	4.3	
8	19	4.4	
6	20	4.5	4.4
14	21	3.5	
8	22	3.0	
11	23	4.1	
5	24	4.0	
10	25	4.5	3.8
3	26	3.3	
5	27	5.6	
2	28	3.5	
1	29	1.0	
3	30	5.3	3.7
1	31	3.0	
1	32	3.0	
3	33	2.3	
1	34	2.0	
1	35	3.0	2.7
331			
Ave.	15.5		
A. D.	4.6		
P. E. M.	.21		
Q.	3.7		

It may be said that on the whole the speedy guessers did no better than the slow guessers. From the data in Table XIV we may safely draw the inference that too great speed in guessing is accompanied by ineffectual riddle solving, and that only the moderate guessers are the successful solvers of these problems. Likewise, too low a speed goes with a poor accomplishment as compared with these normal or moderate guessers.

In order to show that the successful participants are normal guessers we give the following statement: Average number of guesses of lowest twenty-five per cent of the cases is 9.0 guesses, with average number of solutions as 3.7; for the highest twenty-five per cent the average number of guesses is 24.1, and the average number of solutions for the same is 3.9. For the inter-quartile range of the distribution the average number of guesses is 14.7 and the average number of solutions is 4.6. This proves conclusively that the normal guessers are the more successful in the solution of riddles.

Rare and Common Guesses

From the Frequency Tables (I to X) for the riddles given above we find that some guesses occurred but once in the group results for a single riddle and some occurred as many as one hundred and ninety times or even two hundred and twenty-six times. The former would be rare guesses—as we have said above—and the latter would be common or usual guesses.

The question now for consideration is: What effect did slow and rapid guessing have on rare or unusual associations and what effect did they have on common or usual associations as they appear in the data?

An analysis of the material, representing the number of rare guesses to a subject and the average frequency of guesses to that subject, was obtained. The results are given in Tables XV and XVI. To derive such tables all the guesses and their frequencies were arrayed riddle by riddle according to number of guesses and to subjects. It could be seen then how often any subject used a guess with a frequency of 1 or a frequency of 2 or of any other frequency in any riddle.

To obtain Table XV the rare or unusual guesses (1's and 2's) were collected for all the riddles; the average number of 1's (or 2's) to the case was ascertained; and the per cent. of 1's (or 2's) to the guess was found. To find the last-named item the average was divided by the total number of guesses. For instance the number of persons guessing 9 guesses was 12. There were 13 guesses of the 1st degree of unusualness. The average for the group of 12 was 1.1 guesses of the 1st degree of rareness. This 1.1 was then divided by the 9 to obtain the per cent. of rareness of

1st degree to the guess. Such a procedure was carried out for all guesses in the case of both 1st and 2d degree of unusualness and thus the table was obtained.

When we examine the array of data in Table XV with special reference to the influence which speed has on unusualness of either 1st or 2d degree we note that the columns representing the per cent. of 1's (or 2's) incline to have their numbers indicate larger per cents. near the top and the bottom of the columns. But when we take the data in steps of five we find the tendency more clearly shown.

TABLE XV

Showing Per Cent. of Rare Guesses of 1st and 2nd Degree to Each Guess.

	Rareness of 1st Degree			*Rareness of 2nd Degree*		
No. Guesses	*Ave. No. of 1's to the case*	*% of 1's to a guess*	*Ave. %*	*Ave. No. of 2's to the case*	*% of 2's to a guess*	*Ave. %*
5	1.0	20	20	1.0	20	20
6	.7	11		.3	4	
7	.9	12		.5	7	
8	1.0	12				
9	1.1	12		.3	3	
10	.9	9	11	.4	4	4
11	.4	3		.4	3	
12	.8	6		.9	8	
13	.7	5		.5	4	
14	.5	4		.8	6	
15	1.5	10	6	.6	4	5
16	1.9	12		.9	5	
17	2.0	12		1.0	6	
18	1.8	10		.9	5	
19	2.4	13		1.0	5	
20	2.3	12	12	1.1	6	5
21	2.7	13		1.2	6	
22	3.4	15		1.8	8	
23	4.1	17		1.5	7	
24	4.0	16		2.2	9	
25	3.5	14	15	1.8	7	7
26	3.0	12		2.3	9	
27	4.6	17		1.6	6	
28	6.0	21		1.5	5	
29	4.0	14		5.0	17	
30	4.0	13	15	3.3	11	10
31	6.0	20		2.0	7	
32	5.0	15		4.0	13	
33	8.7	26		2.0	6	
34	7.0	21		3.0	9	
35	9.0	26	22	5.0	14	10

TABLE XVI

Showing Average of "Frequency Values" Reduced to Per Cents for Purposes of Comparison

Number of Guesses	*Averages of Frequency Values Expressed as Per Cents of Totals*	*Ave.*
5	2%	2%
6	9%	
7	9%	
8	11%	
9	9%	
10	16%	11%
11	15%	
12	14%	
13	14%	
14	15%	
15	14%	14%
16	13%	
17	13%	
18	13%	
19	12%	
20	12%	13%
21	10%	
22	10%	
23	11%	
24	10%	
25	9%	10%
26	9%	
27	10%	
28	8%	
29	6%	
30	11%	9%
31	8%	
32	5%	
33	6%	
34	7%	
35	11%	7%

Table XVI was derived from the same array of figures as the preceding table in which a subject's guesses were expressed in terms of frequencies in any riddle. These were averaged and this average we call "average of frequency values." This was then divided by the total number of guesses made by all subjects in that riddle to obtain a per cent. Having these for all subjects and for all riddles made it possible to secure average percents, for these were averaged and the result in each case was called "average of frequency values reduced to percentages for purposes of comparison." The object here was to obtain some common measure of usualness (commonness or homogeneity) of guesses of each subject for purposes of comparison.

Conclusions

From this experiment some rather definite conclusions follow:

1. One must believe in the trial and error character of the method employed in riddle solutions.

2. Speedy guessing tends, as thus objectively determined, to militate against successful guessing.

3. Rare associations characterize speedy guessing.

4. Usualness or homogeneity of guessing marks the average guessers' associations and is not characteristic of the speedy guessers.

5. Slow guessing is not marked by successful solutions nor homogeneity of associations. However, the unusualness as determined in this experiment is not so great as in the case of speedy guessers.

An Inquiry Into the Statistical Basis of a Conclusion Concerning Sex Differences

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FOR many years psychologists and educators have been interested in the problem of sex differences in relation to education. Studies dealing with different phases of this subject have been made in America and several European countries. These studies have lacked unanimity of conclusion, however, and have not established laws that psychologists and educators have been ready to accept. It is true that numerous conclusions have been made which have been accepted by many and quoted widely; but at the same time these have been disbelieved and rebutted by others. This article is concerned with the statistical basis of such a conclusion.

In 1915 Yerkes, Bridges and Hardwick published a monograph explaining the derivation and standardization of *A Point Scale for Measuring Mental Ability*. The authors of the scale were convinced that their data showed some pronounced sex differences. The following conclusions are quoted from their monograph:[1] "These two sex groups, although not large, exhibit surprisingly pronounced modes, that for the girls being constituted by the 55 point class—and that for the boys the 65 point class. It appears from these distribution curves that at ten years of age the difference in mental capacity between boys and girls is so great that its neglect would inevitably lead to unfair evaluation of individual results," and [2]"We are fully convinced, however, that the accurate determination of norms for the sexes is eminently desirable, and we suspect that at certain ages serious injustice will be done to individuals by evaluating their scores in the light of norms which do not take account of sex differences."

Two very interesting statistical points are involved in the method by which this conclusion was reached, (1) the wisdom of using the mode as a measure of central tendency and (2) the validity of conclusions drawn on so few data.

The distributions referred to in the above quotation are shown in Table 1, Parts 1 and 2.

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[1] *A Point Scale for Measuring Mental Ability*. Page 63.
[2] *Idem*. Page 73.

TABLE NO. 1

Frequency tables of Point Scale scores for the English speaking, ten-year old children in School "B."

PART 1

Ungrouped Data.

Boys	Girls
44	39
48	40
52	47
54	48
54	50
56	51
58	54
60	55
61	56
63	57
65	58
65	59
65	59
66	59
66	59
66	60
66	60
67	60
67	66
69	67
73	67
74	72
76	72
78	74
84	77
	77
	79
	80

PART 2 (For Fig. A)

Distribution Used by Yerkes.

Interval.	Frequency. Boys.	Girls.
35-39	0	1
40-44	1	1
45-49	1	2
50-54	3	3
55-59	2	8
60-64	3	3
65-69	10	3
70-74	2	3
75-79	2	3
80-84	1	1

PART 3 (For Fig. B)

Data rearranged—Interval the same size.

Interval.	Frequency. Boys.	Girls.
38-42	0	2
43-47	1	1
48-52	2	3
53-57	3	4
58-62	3	8
63-67	10	3
68-72	1	2
73-77	3	3
78-82	1	2
83-87	1	0

PART 4 (For Fig. C)

Size of interval increased to eight.

Interval.	Frequency. Boys.	Girls.
35-42	0	2
43-50	2	3
51-58	5	6
59-66	10	8
67-74	5	5
75-82	2	4
83-90	1	0

These figures were taken from data found on page 53 of the monograph, grouped according to directions on page 61, and express the frequency of scores on the point scale for 53 children, 25 boys and 28 girls. The "surprisingly pronounced modes" can be seen at the "55 point class" for the girls and the "65 point class" for the boys. It is evident from these data that the central tendency for the girls is ten points below that for the boys: hence the authors' generalization concerning sex differences. It is also obvious that this conclusion is based upon a modal value concerning which Rugg says [3] "This specific modal value—depends, within a certain range over the scale, upon the *size* and *position* of class-intervals." Acting upon Rugg's suggestion it is our purpose to change the size and position of the class-intervals and observe the result upon the modes. In the table of frequency given in Table 1, Part 2 the class interval is five. The 55 point class, quoted from the monograph, is made up of scores 55,56,57,58 and 59 and all other intervals are arranged in a like manner. If 55 is made the midpoint instead of the lower limit of a class interval, which includes scores 53, 54, 55, 56 and 57, and a like change is made in the position of all intervals, then we have the distribution given in Table 1, Part 3.

It is evident that by using the same interval but changing its position as we have done the modes have been brought nearer together. We still have two "surprisingly pronounced modes" but they are fifty per cent. closer together; that is, they are now separated by five points instead of ten as before. It is evident that a change in mode has accompanied the change in position of the class intervals. It is our purpose now to change the size of the interval. The authors have grouped five scores together in a class. There is no valid statistical reason why data should be grouped in intervals of five. To illustrate this point the data are grouped in class intervals of eight in Table 1, Part 4. No attempt will be made to justify the use of a class interval of eight with these data because this example is given merely to show how unstable the modal value is.

Here the modes for the two sexes are at the same interval, the boys having a frequency of 10 and the girls a frequency of 8. The conclusions concerning sex differences made by the authors on the basis of the modes shown in Table 1, Part 2, lose half of their

[3] H. O. Rugg. *Statiistical Methods Applied to Education.* Page 101.

significance when the data are rearranged as in Table 1, Part 3, and lose all of their statistical basis when the data are arranged in other class intervals as in Table 1, Part 4. Hence, it seems fair to conclude that generalizations made on the basis of modal value have no sound statistical value.

Other averages have been computed for these data and a comparative table of their value is given below.

	Arithmetic mean.	*P. E.*
Boys, ...	63.9	1.24
Girls, ...	60.8	1.43
Difference, ...	3.1	
	Median.	*P. E.*
Boys, ...	65.8	1.55
Girls, ...	59.7	1.79
Difference, ...	6.1	
	Mode. (as used by Yerkes).	
Boys, ...	65	
Girls, ...	55	
Difference, ...	10	

It appears from the above that no pronounced sex difference is shown. On the basis of the arithmetic mean or the refined median this difference is slight when the P.E. is taken into consideration.

Two interesting questions can be asked from the standpoint of statistics. (1) Is it fair to make conclusions concerning general differences in mental ability, as judged by the point scale, on the basis of a 3.1 difference in arithmetic mean? (2) Is the point scale method so refined that one can be sure that the P.E. might not be greater than any of the above differences?

The second point concerning the statistical basis of the conclusions we are dealing with has to do with the number of cases considered. Turning to Table 1, Part 2, we find that the modal point for the girls is the 55 point class, and that 8 girls and 2 boys receive such a score. In the same manner it can be shown that a majority of 7 boys are found at their modal point. It is obvious, then, that the conclusions concerning sex differences are made on the basis of 6 girls and 7 boys.

The authors were evidently justified in making their conclusions on the basis of the arrangement of the data as given in the monograph and were also conscious of the limited number of cases considered; but it appears from the rearrangement of the data that no differences between the sexes, as great as indicated by Yerkes, exist.

COMMUNICATIONS AND DISCUSSIONS

AGE-GRADE DISTRIBUTION AND INTELLIGENCE QUOTIENT

IN the issue of the JOURNAL OF EDUCATIONAL PSYCHOLOGY for November, 1919, appeared an article on age-grade distribution by Superintendent Ernest C. Witham, of Southington, Conn.

The discussion gives age-grade statistics for several school systems, in each case, the tabulation of over-ageness shows a rapid increase up to the fourth or fifth, and, in one or two cases, the sixth grade, and a corresponding decrease beyond this point.

Undoubtedly any one who has made any continued study of conditions has found the same characteristics with regard to over-ageness. Doubtless most of us have asked the questions that Supt. Witham asks: "What is the reason for so much more retardation in the fourth grade than in any other grade?....Is the course of study too difficult for the fourth grade?"

For the past six years I have been noting these conditions, and wondering what can be done to improve them. Naturally, the first thing to suggest itself was better teaching in the lower grades. However, it soon appeared that, while better teaching might help the fourth grade slightly, still the same piling up occurred, and was bound to occur somewhere along the line, if not in the fourth, then in the fifth or sixth.

The establishment of the theory that the distribution of intelligence follows the curve of normal distribution seems to answer the question "why?". If we accept this theory, as, it seems, we must, then there will always be a certain per cent of the pupils of any school who have not the mental ability to complete successfully the work of the fourth grade, another per cent who can do the fourth, but not the fifth, etc. There is also, of course, a certain per cent who cannot successfully complete the work of the first, second, and third grades, but usually these are carried along by the tendency of teachers to promote according to chronological age, and to send pupils whom they know cannot do the work, to the next grade in the hope that they "can get something there," which, of course, is impossible. In this way many of these pupils get to the fourth

grade where they are in such deep water that it is very apparent to every one that they cannot be allowed to go further. There they stay until their age allows them to leave school.

The investigations of Dr. Terman (Intelligence of School Children) show that the intelligence quotient, (found by dividing the mental age in months by the chronological age in months, and denoted by I.Q.) changes very little, if at all, in the individual child. Thus a child having an I.Q. of 75 will never attain a mental age of much more than 12, one of 60 I.Q. will never have a mental age of over 10 (9 yrs. 8 mo.), etc. It further appears from Dr. Terman's investigations that a mental age of about 10 is required to do successful work in the fourth grade, 11 in the fifth, 12 in the sixth, etc.

Now, according to the theory of normal distribution, there are about 2% of all children who have I.Q.'s of 60 or less, and who will, therefore, never be able to do successful work beyond grade four, and about 6% more with I.Q.'s less than 80 who can never successfully go beyond the sixth grade. Moreover the 2% above noted cannot do fourth grade work much before the age of 16, and the remaining 6% will have to be the same age to do successfully sixth grade work. All of this group, therefore, stay in the fourth, fifth and sixth grades until they are allowed to leave school.

In support of these statements I submit herewith a survey of the intelligence of the pupils of the Brewster school, from the fourth grade through the high school as measured by the "Otis Group Intelligence Scale."

Brewster is a village of about 2000, inhabited mainly by American born. Not over 5% of the pupils in the school are of foreign born parents. It is similar in population to hundreds of other villages in New York and New England. The school consists of about 450 pupils, from the first grade through the high school. The high school department contains about 65. The Otis tests were given to the whole group within a period of two weeks. All tests except the upper high school were given by the writer. Great care was taken to follow exactly the prescribed procedure, and conditions were identical in each of the tests. One grade was tested beginning about 10:00 a. m., and another about 2:00 p. m. on each day. The high school pupils were tested in two groups the same afternoon, one test being conducted by the principal of the school, who had

previously been present while some of the grades were being tested, and was supplied with a copy of the manual of directions. The results, therefore, are certainly comparable as between grades and individuals.

Assuming the usual figures for the normal age in each grade, viz. 9-10, for grade four, 10-11 for grade five, etc. we find that, of 56 over-age pupils registered in the grades only two are above 100 I.Q., and that, of 23 under-age pupils, only four are below 100 I.Q., and that these four are all above 90 I.Q.

According to our theory, if the pupils of the various grades were viz. 9-10, for grade four, 10-11 for grade five, etc., we find that, grade, a correlation of—1 between the chronological age and the I.Q. The correlations in these grades are as follows; grade 4.—.57, grade 5,—.72, grade 6,—.65, grade 7,—.79, grade 8,—.63. The correlation in the fourth grade is considerably lower than the others on account of the piling up of pupils of low I.Q. If we eliminate the 10 below 70 the correlation in this grade is —.72. In the upper grades the correlation is lower than it should be on account of a number of pupils of high I.Q. who are behind the grade their mental age would entitle then to be in.

THE I.Q. DISTRIBUTION IN BREWSTER H. S.
TABLE I

	Below 70	70-89	90-109	110-129	130 and Above	Total Cases	Median I.Q.
GRADE							
4	10	10	8	6	1	35	85
5	12	15	4	7		38	79.3
6	4	8	17	3	1	33	95.3
7	3	9	12	12		36	100
8		6	20	13	3	42	105
ACADEMIC							
1		1	13	7	2	23	101.7
2			14	7	1	22	105.7
3			2	5	2	9	120
4			1	3		4	116.7
Total.	29	49	91	63	10	242	95.6

It will be noted that the median I.Q. varies from 79 in the fifth grade to 105 in the eighth, and that for all years of the high school it is above 100. In the seventh grade there are three pupils below 65 I.Q. who have been dragged along by chronological promotions. Aside from these no pupil of this grade is below 80 I.Q. In the eighth grade the two pupils below 80 I.Q. are not able to do the work of the grade successfully, and will probably drop out at the end

of the year. The 17 year old pupil, particularly, has, it must be admitted, plenty of grit to stick to it as long as she has, but what chance has she in competition with the brilliant 12 and 13 year olds in the group?

In the first two years of the high school there are only 3 pupils who have an I.Q. of less than 90, and in the last two years no pupil has an I.Q. of less than 105. This seems to indicate that successful high school work cannot be done by pupils of less than normal intelligence. If this is true our high schools, instead of being the democratic institutions we have always claimed then to be, ("The University of the Masses," they have been called) in reality present an insurmountable obstacle to half of all our children, and that the upper grades automatically shut off a large per cent of children.

TABLE II
DISTRIBUTION OF 12-YEAR OLDS IN BREWSTER H. S.

	Below 70 I.Q.	70-89	90-109	110-129	130 and Above	Total Cases	Median I.Q.
GRADE							
4	1					1	57.5
5	5	6				11	71.25
6	1	4	8	1		14	94.9
7				3	8	11	114.2
8			3	3	1	7	117.5
Total,	7	10	14	12	1	44	99.99

Table II shows the distribution of 12 year olds. All of these are still in school as they cannot be released on account of the compulsory attendance law. Of the 44, occurring in every grade from the fourth to the eighth, 22 are below 100 I.Q., and 22 are above. All of the 12 year olds in the fourth and fifth grades are below 90 I.Q., and all in the seventh and eighth grades are above 90 I.Q.

TABLE III
DISTRIBUTION OF 14-YEAR OLDS IN BREWSTER H. S.

	Below 70 I.Q.	70-89	90-109	110-129	130 and Above	Total Cases	Median I.Q.
GRADE							
4	1					1	41
5	2					2	46.5
6	2					2	60
7		4	6	1		11	92.5
8		1	8	2		11	102.5
H. S. 1			4	2	1	7	109.2
2			1			1	102
Total	5	5	19	5	1	35	100.3

Table III shows the distribution of 14 year olds. Seventeen of these are below 100 I.Q., and 18 are 100 or above. The medium I.Q. for the 12 year olds in each grade varies from 57 to 117, and for the 14 year olds, from 41 to 109. The one 14 year old in the fourth and the two in the fifth are not able to do the work of these grades, but have been shoved along by the teachers below who had them for two or three years and had gotten tired of them.

At the time the tests were given, each teacher in the grades was asked to rate her pupils' intelligence on a five point scale as follows: Very Superior=A, Superior=B, Average=C, Fair=D, low=E. Afterward the pupils of each grade were rated on an I.Q. scale as follows: 130 I.Q. and above=A, 110-129=B, 90-109=C, 70-89=D, below 70=E. The correlations between these ratings and the teachers ratings were as follows: Grade 4, .67, grade 5, .60, grade 6, .57, grade 7, .65, grade 8, .62. The general tendency in the lower grades was to rate too high, and in the upper grades to rate too low. Taking into consideration the median I.Q. of the various grades this is easily explained. Each teacher, naturally, rated the individuals in comparison with the whole group. This was her only basis for such rating. The fourth grade, with a median I.Q. of 85 had as many Bs as the eighth grade with a median I.Q. of 105 on the teachers' rating. One or two teachers, in spite of instructions as to what the distribution should probably show, placed the large part of their classes on the extremes, having more As and Ds than Cs. It is hard, too, for the teacher to take the age of the pupil into account; she usually gives old and young pupils the same mark if their class work is about equal.

These being the facts of the case, what is the remedy? If it is going to be impossible to get rid of our high retardation because of this group without sufficient intelligence to do the work of any grade higher than the fourth or fifth, then the only thing for us to do is to see to it that the pupils in the upper part of the I.Q. scale are advanced as rapidly as their intellectual development will allow. In this way we will, at least, have a group of under-age pupils which will balance the over-age group.

The railroad train despatcher has a chart showing the location of every train on his division. By the use of this he is able to keep each one going at its best rate. An age-grade-I.Q. chart will serve

the same purpose in the school. By its use the school executive will be able to pick the individuals who can go faster than the main group and give them a clear track ahead.

For the past three years the writer has experimented somewhat along these lines. The basis of selection has been the Trabue Completion Test. About eight or ten pupils in the Brewster school, and a smaller number in some of the other schools of the county have been "skipped" each year on this basis. But while the correlation between the Trabue scales and the Otis test is high (.60 to .70) there are, of course, several pupils of high I.Q. who have not been recognized by its use.

There are a number of pupils in the school who could profit by skipping a grade. For example, in the fourth grade is a pupil of 169 I.Q., the highest in the school, who has a mental age of about 15 and who, therefore, is able to do first year high school work. There are also three ten year olds in the fourth grade who have higher I.Q.'s than a majority of the ten year olds in the sixth grade. Likewise there are five or six in each of the other grades who can do work one, two, or three years ahead of their present location, and who, now that we have discovered them, will get the opportunity they deserve.

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EDITORIAL

The Educational Quotient

ONE of the most important elements in the development of educational investigation has been the interest aroused in tests of intelligence. Beginning in 1904 under the masterly insight of Alfred Binet with a loose aggregation of tests to differentiate the mentally defective from the normal, they have been elaborated and refined and adapted to multifarious uses in both war and peace. The fundamental conception on which the earlier Binet scale rested was that of mental age. This assumed that there was a certain measurable increment of intelligence for each year of chronological age, and that this was independent of the specific training that the child had received. This, of course, did not mean that each individual child, or that any individual child, would show just this mentally defective fro mthe normal, they have been elaborated and increment, but if the central tendency of a large number of measure-

ments was taken, this could be accepted as the norm or standard of mental age for any given year of growth. Later investigators found it advisable to have a single mathematical expression for the relation between the measured intelligence of an individual or a given age and the norm for that age. This was called the Intelligence Quotient, and in the hands of Terman and his students has come to be a most significant index of the individual's native capacity. The claim is made that the I.Q. (as it is usually referred to) is practically constant for a given individual at all ages, and that it therefore serves as an index not only to present capacity but of future development.

Whether the mental age, and therefore the I.Q., is a function solely of native intelligence entirely unaffected by experience is open to question. Indeed it is difficult to believe that intelligence of any sort could be purely native. No manifestation of intelligence springs full-fledged into existence. It is always a development of potentialities under the influence of an appropriate environment. Intelligence does not appear in a vacuum. It is only in response to present problems that intelligence exists, and all our responses are modified by experience. Probably what the I.Q. shows is the degree of modification an individual has undergone under an environment relatively common to all. The I.Q. is thus an index of learning under the ordinary conditions of life, and may justly be taken as an indication of future learning.

But the learning that goes on under the common, general environment is only one phase of our development, and not the phase with which the school is directly concerned. The purpose of the school is to provide an artificial environment to accelerate certain types of learning, and while one's general capacity to learn may be of basic importance for success in school learning, the history of the doctrine of 'formal discipline' bids us be cautious in carrying our assumptions of general intelligence too far. In other words, the I.Q. needs to be supplemented by an index of specific school abilities, the E.Q., or Educational Quotient. The development of standard tests to furnish a measure for the E.Q., the combination of these tests into an educational scale, the determination of educational norms for different ages and environmental conditions, the amount of educational change that can be produced in a given time by given means, the correlation between the I.Q. and the E.Q., are

among the interesting problems with which educational investigators are now grappling. One investigator reports already that the E.Q., as determined by a battery of representative tests in school subjects, tends to approach unity much more closely than the I.Q. The reasons for this afford an interesting field for speculation. Perhaps the educational environment, kept under conscious control, offers less opportunity for individual variation than the general environment. Perhaps we are actually succeeding in forcing all our children into the same educational mould. If so, is this a good or an evil? At all events the E.Q. bids fair to open up as many interesting questions as the I.Q., and to be of much greater practical significance for educational procedure.

J. C. BELL.

NOTES AND NEWS

Charles E. Skinner, of Ohio University, has been elected to the chair of psychology and philosophy at Mount Union College, Alliance, Ohio.

Dr. H. O. Rugg, of the University of Chicago, has been appointed educational psychologist at the Lincoln School, of Teachers College, Columbia University.

Dr. John W. Hall, professor of elementary education in the Univeristy of Cincinnati, has accepted the position of dean of education at the University of Nevada.

At the annual meeting of the New York Academy of Sciences, December 15, Dr. Edward L. Thorndike was elected president and Dr. R. S. Woodworth one of the vice-presidents.

Charles L. Harlan, formerly instructor at the college of education of the University of Minnesota, has been appointed director of the newly established bureau of standards and measurements at the State Normal School, Lewiston, Idaho.

Dr. Ellsworth Faris, acting director of the Iowa Child Welfare Research Station during the war, and research professor of sociology at the University of Iowa, has been appointed to a professorship in sociology at the University of Chicago. He is to be in charge of the work in social psychology.

Dr. Walter VanDyke Bingham, director of the division of applied psychology of the Carnegie Institute of Technology, has been

elected first chairman of the Division of Anthropology and Psychology of the National Research Council and has been granted half-time leave until July 1, 1920.

Superintendent Ernest C. Witham, of Southington, Ct., has recently issued a test of South America in his series of Standard Geography Tests. The test is composed of ten questions dealing with the physical, political, industrial and social geography of South America. The standardization of this test will be awaited with interest.

The United States Bureau of Education has established a research station at the University of North Carolina with Dr. L. A. Williams, of the school of education, as director. With a view to cooperation in educational problems, Dean M. C. S. Noble and Dr. Edgar W. Knight, of the School of education, have been named as special collaborators.

Captain Garry C. Myers, of the Army Recruit Educational Center, Camp Upton, N. Y., delivered an address before the Normal School Section of the New York State Teachers Association at Albany, November 26, on "The Application of Group Intelligence Tests to the Schoolroom." After the address Mrs. Myers demonstrated a new group intelligence test designed for school children of all ages.

The December meeting of the New York Society for the Experimental Study of Education was held on December 12, with the general topic of "Problems in the Teaching of Reading." Professor William A. McCall, of Teachers College, spoke on "Reading as a Barometer of School Efficiency," stressing the value of standard measurements in reading as an index of general educational progress, and Professor Thomas H. Briggs, of Teachers College, discussed "The Significance of Silent Reading in Education" with especial reference to the specific training in silent reading that should be given in the schools.

The following is of interest to psychologists, although probably not animated by the spirit of scientific psychology: "The Rev. Dr. William T. Manning, rector of Trinity Parish, New York, offered a resolution in the House of Deputies of the Episcopal Church at the general convention in Detroit, providing for the appointment of a committee 'to consider the fuller recognition of the ministry of healing in the Church and the need of its revival under proper

sanctions and safeguards." The resolution was unanimously adopted and sent to the House of Bishops for concurrence. Dr. Manning has been interested in an English faith healer who has held clinics at Trinity Church.

An appropriation of fifty thousand dollars in five annual payments has been granted to the Iowa Child Welfare Research Station of the State University of Iowa, of which Dr. B. T. Baldwin is director, by the National Women's Christian Temperance Union, for the purpose of making detailed scientific investigation into the development and conservation of child life. The gift is for research and the station will be given a wide range of freedom in the selection of its problems, which will center around the field of eugenics, nutrition, and the mental and social development of the child. Dean Carl E. Seashore is chairman of the advisory committee.

Captain G. C. Myers, now in charge of army educational work at Camp Upton, Long Island, has devised a new test of intelligence denominated the Myers Mental Measure. This scale has grown out of the author's experience in using various form of the Army mental tests, but has also been standardized by extensive use with school children. The claim is made that it measures intelligence in the first school grade about as well as in any other grade, that it correlates highly with the Stanford Revision of the Binet Tests, that it consists wholly of pictures and is therefore applicable to minutes to groups of from ten to one hundred children at a time, illiterates and literates alike, that it can be given in less than 20 that it requires little previous training to give, and that it is easily and rapidly scored by clerical aids. Copies of the scale may be procured from the author or from The Sentinel Press, Carlisle, Pa.

At the annual meeting of Section H, Anthropology and Psychology, of the American Association for the Advancement of science, held at St. Louis, December twenty-ninth and thirtieth, it was announced by the Council that the Section would be divided. Section H in the future will be given over to the anthropologists and the new Section I will be devoted exclusively to psychology.

The following officers of the new Section I were elected:

Professor Edward K. Strong, Jr., Carnegie Institute of Technology, Vice President of the Association and Chairman of the Section; Professor F. N. Freeman, University of Chicago, Secre-

tary, four years; Professor Walter D. Scott, Northwestern University, Member, Sectional Council, 1 year; Professor W. S. Hunter, University of Kansas, 2 years; Dr. J. E. W. Wallin, St. Louis Public School System, 3 years; Dr. Helen T.Woolley, Cincinnati Public Schools, 4 years.

At Brown University a committee on educational advice and direction has been appointed to gather biographical material regarding every student before he enters college. Through correspondence with his parents and school teachers, through personal interviews, and through psychological tests the committee will be informed in the case of every freshman as to his capabilities, tastes, mental peculiarities or deficiencies, his previous successes or failures in scholarship, character, athletic sports, student activities, etc. On the basis of such data the committee will advise him regarding the degree for which he should enter, the choice of elective studies, and the conduct of his personal life. Later in his course—not later than the end of the sophomore year—the committee will again advise him regarding the nature of the chief callings in modern life and the proper concentration of studies in the junior and senior years in order to fit him for the highest service in the world.

The Indiana University Bureau of Cooperative Research has issued an interesting announcement of special projects for investigation during the year 1920. One is the measurement of achievement in algebra. The Rugg-Clark and the Holtz algebra tests are to be given at the completion one half year of algebra work, at the end of one year, and at the end of one and one-half years of work. These scores are to be compared with the teachers' ratings, and special disabilities in algebra work are to be carefully analyzed. Another investigation on the changes in the handwriting of the same pupils as the progress from grade to grade through school will be continued, samples being collected this year from the fifth grades in forty cities. Further applications of the Indiana primer scale, the brief survey scale for grades IV to X, and the more elaborate examination (Schedule D) will be made to determine state norms for diagnostic and administrative purposes, and the reliability of these tests for promotions, sectional groupings, and the placement of pupils. The scales have already been used with over 86,000 children. Another investigation deals with the present salaries and qualifications of teachers in the state.

The twenty-eighth annual meeting of the American Psycological association was held at Harvard University, December 29-31, 1919. Among the papers presented that were of especial interest to educational psychologists were "Are there any Instincts?" Knight Dunlap; "A Comparison of Motor Tests with Estimates of Character, Mental Test Scores, and University Grades," F. A. C. Perrin; "The Average Mental Age of Adults," E. A. Doll; "Superior Intelligence Quotients in Mental Breakdown," F. L. Wells; "A Study of the Intelligence of 250 Delinquent Girls," E. L. Woods; "Ability in Mental Tests in Relation to Reading Ability," L. W. Webb; "Some Recent Work in Mental Tests for College Students," L. L. Thurstone; "Intelligence Tests at Brown University," S. S. Colvin; "Some Notes on Early Imaginative Behavior of Children," G. C. Myers; "Variations in Mental Equipment not indicated by an Intelligence Ratio," A. F. Bronner; "Evaluation of School Attainment in Terms of Mental Ability," R. Pintner; "A Study of Factors Other than General Intelligence, Important for the Prognosis of School Success," S. L. Pressey; "Results Obtained on the First Three Grades by Means of a Group Scale of Intelligence," L. C. Pressey; "Psychological Tests in the Training of Teachers," E. A. Kirkpatrick; "The Combined Use of Mental and Educational Tests, Illustrated in the Case of Language," Daniel Starch; "The Cooperation between Interests and Abilities in College Courses," J. W. Bridges; "What Industry Wants and does not Want from Psychology," E. P. Frost; "An Important Constant Error in Psychological Rating," E. L. Thorndike; "The Extension of Rating Scale Theory and Technique," B. Ruml and D. J. Patterson; "Recent Development in Trade Test Theory," A. Kornhauser and B. Ruml. The Presidential Address, by Dr. Walter Dill Scott, was on the subject "Changes in Some of our Conceptions and Practices of Personnel." Dr. Sheperd I. Franz was elected president for the ensuing year.

PUBLICATIONS RECEIVED

RUDOLPH PINTNER. *Aesthetic Appreciation of Pictures by Children.* Reprinted from the Pedagogical Seminary, Vol. 25, 1918. Pp. 216-218.

Children from six to fourteen years old were asked to arrange six pictures in order of their preference for beauty. Their judgments conform closely to the aesthetic standards of adults. The conformity develops gradually, being well marked in children of seven years and practically completed at the age of ten.

RUDOLPH PINTNER. *Intelligence as Estimated from Photographs.* Reprinted from the Psychological Review, Vol. 25, 1918. Pp. 286-296.

Teachers, physicians, psychiatrists and others claim that they are able to judge of the intelligence of a person by looking at him. To test this, twelve children were examined for their intelligence by the Yerkes-Bridges scale and their photographs were then ranked for intelligence by nine physicians, fifteen psychologists, eleven students, seventeen teachers and eleven miscellaneous individuals. The coefficients of correlation were all low, the highest being +.31 by the psychologists. The physicians averaged only +.11 and the teachers +.17. The author believes that the correlations would not have been much higher if the children themselves had been inspected instead of the photographs. Judgments of intelligence are unreliable unless made with reference to an objective criterion.

RUDOLPH PINTNER. *The Mental Indices of Siblings.* Reprinted from The Psychological Review, Vol. 25, 1918. 252-255.

In the course of extensive school surveys it was found that children from the same family showed an appreciably higher association coefficient in six standard tests than children taken at random. The fact that the coefficients were not as high as those obtained by other investigators is probably due to the inadequacy of the rough survey tests.

RUDOLPH PINTNER AND HERBERT TOOPS. *A Chart for Rapid Computation of Point Scale Scores.* Reprinted from The Journal of Delinquency, Vol 2, 1917. Pp. 209-210.

This is a chart of coefficients of mental ability, with indications of Yerkes-Bridges scores, chronological ages, and mental ages so arranged as to show at a glance the mutual relationships. The chart is printed in colors, yellow indicating very bright, red-bright, white-normal, blue-backward, and green-feeble-minded.

RUDOLPH PINTNER AND HERBERT TOOPS. *A Drawing Completion Test.* Reprinted from the Journal of Applied Psychology, Vol. 2, 1918. Pp. 164-173.

Twenty-five outline drawings of familiar objects, each of which has some part missing, were presented to about 1400 children from five to sixteen years of age with the request to indicate the missing part. The pictures are then ranked according to the percentage of correct indications.

A POROT ET A. HESNARD. *Psychiatrie de Guerre. Etude Clinique.* Paris: Librairie Felix Alcan, 1919. Pp. 315. 6 francs.

Now that the shock of war is over and the insistent demands upon men of science for immediate action are relaxed, opportunity is given to take account of stock and to evaluate the data brought out by the war in terms of their significance for times of peace. The present work gives a birds-eye view of the whole field of war psychiatry from the battle-line, the camps, the marine barracks, to the hospitals and the sanataria. Perhaps it is true that there is no "war psychiatry" in the sense of novel disease syndromes, but the physical and emotional strain of the struggle was such as to bring into sharper outline the details of mental disturbance and to hasten the development of the ordinary stages of psychoses. The authors consider the effect of war upon morbid predispositions, the reactions of different races to war stresses, the clinical syndromes of mental

confusion, the amnesias, the phobias, the psychasthrenias, delirium, mania and choses. The development and course of the disturbances are studied and suggestions are made for an enlightened psychiatric therapy. There is a bibliography of 24 pages.

S. D. Porteus. *Cephalometry of Feeble-Minded.* Reprinted from the Training School Bulletin, June, 1919. Pp. 1-24.

In 1918 the author published precentile tables of the brain capacity of 9000 normal individuals from eight years to maturity. The present study compares the first fifty unselected cases from the Vineland Training School with these norms. Seventy-two per cent of these cases were found to lie outside the normal limits of head form or size. Some of these were larger than the normal, but by far the greater number were smaller. Nothing is said in this article about the type or degree of feeble-mindedness. It would be of interest in future studies of cephalometry to take account of these differences and to try to connect certain types of mental defect with specific cranial abnormalities.

S. D. Porteus. *Porteus Tests—The Vineland Revision.* The Vineland Training School, Department of Research, 1919. Pp. 44.

"There is an urgent need for tests which will evaluate those characteristics which are most essential to social success, and which are not tested by the Binet Tests. Amongst these capacities are forethought and planning capacity, prudence and mental alertness in meeting a situation new to experience. The Porteus tests largely meet this need. The graded maze has many advantages as test material, chief being that it provides a problem which, because of the capacities required for success, approaches most nearly a real life situation." The tests have been standardized by application to 2453 children, and developmental curves are given for the ages of six to thirteen in both the Porteus and the Binet tests and in height, weight, grip and vital capacity.

Sydney L. Pressey. *A Comparison of Two Cities and Their School Systems by means of a Group Scale of Intelligence.* Reprinted from Educational Administration and Supervision, Vol. 5, 1919. Pp. 53-62.

The two cities averaged much the same in pupil material, but different parts of the same city showed as much as a year of difference in mental age. Grade standards in schools differ widely. Two grades in one city stood above the average of the next higher grades in the other city. Surveys of mental endowment are quite as important as measures of achievement in educational investigations.

Sydney L. Pressey and Luella W. Cole. *Irregularity in Psychological Examination as a Measure of Mental Deterioration.* Reprinted from The Journal of Abnormal Psychology, December, 1918. Pp. 12.

Between the mental ages of eight and twelve the feeble-minded show an average irregularity of 17 points on the Yerkes Point Scale, dementia praecox 20 points, and chronic alcoholics 22 points. Wide irregularity is, therefore, presumptive evidence against feeble-mindedness, and five particular tests of the scale give a diagostic unit of great value in distinguishing aments from the psychotic.

The Public School System of San Francisco, California. Washington: Bureau of Education, 1917. Pp. 649. $0.60.

Chapter seven of this report is devoted to "Tests of the Achievements of Pupils." Selected classes in elementary schools were tested in penmanship, spelling, reading and arithmetic. In penmanship no attention was paid to rate, and the score in form was based on the pupils' copy of a stanza written on the blackboard. The specimens were scored by the Ayres scale, and the showing was distinctly above the average of 55 cities in all but the seventh and eighth

grades. From the fifth grade on there was no appreciable improvement in form. In spelling ten words were selected from the Ayres scale for each grade such that 73 per cent of the grade was supposed to pass them. The average for the grades was from eight to ten points above the Ayres standard. The Thorndike Scale Alpha 2 was used in reading, and each grade was found appreciably above the standard. The range for the same grade in different schools was very wide. In arithmetic the Courtis Series B and the Stone reasoning tests were used, and over twenty pages are devoted to the discussion of the results. San Francisco children rank high in speed on the fundamentals, but are not so good in accuracy, and in reasoning they are distinctly below the standard.

PHIL AND NELLIE RAU. *Wasp Studies Afield.* Princeton: University Press, 1918. Pp. xv, 372. $2.00.

These delightful accounts of wasp life and habits deserve to rank with the work of the Peckhams and that of the immortal Fabre. In painstaking accuracy of observation and record, in the abundance and variety of illustrations, and in the intimate and fascinating charm of the style the book is the equal of anything that those writers have produced. These are not the imaginative tales of the easy-chair naturalist, but rest upon weeks and months of the most arduous and exacting field studies.They constitute a most welcome and valuable addition to our knowledge of animal psychology.

CHARLES R. RICHARDS. *The Gary Public Schools. Industrial Work.* New York: General Education Board, 1918. Pp. xix, 204. Twenty-five cents.

There are no standard tests or scales in shop work. The lack of standard measures of industrial work makes itself keenly felt in such a school survey as that of Gary. In lieu of them the surveyor had to devise practical tests of his own, which to be sure are of distinct value in comparing pupil with pupil and school with school, but give little idea of the standing of the pupils with reference to any other group. It would seem that some of these tests might be standardized so that they would be available for wider use.

NORMAN E. RICHARDSON. *Religious Education and Reconstruction.* New York: The Abingdon Press, 1919. Pp. 32.

A survey of German conditions leading up to the war, an appeal for the closer union of the sciences and the humanities in education, and a program for religious education that will ensure the moral and religious upbuilding of the American people.

ROY FRANKLIN RICHARDSON. *The Psychology and Pedagogy of Anger.* Baltimore: Warwick and York, 1918. Pp. 105. $1.25.

This is an introspective study of anger as it manifests itself in everyday life. Ten graduate students of Clark University and two persons outside the institution agreed to make detailed introspective records of every state of anger for three months. The present account organizes the records under the headings of the mental situations stimulating anger, the behavior of consciousness during anger, and the characteristics of the disappearance of anger. From this account the stimulating and regulatory effects of anger are deduced, and the significance of anger in education is derived. A mild, controlled form of anger is one of the most potent stimuli to persistent and successful effort.

WILLIAM EMERSON RITTER. *The Unity of the Organism.* Boston: Richard G. Badger, 1919. Two Volumes, Vol. I, Pp. xxix, 398; Vol. II, Pp. xv, 408. $5.00.

The subtitle of this interesting work is "The Organismal Conception of Life." The author, who is the director of the Scripps Institution for Biological Research, University of California, is one of our foremost biologists, and excellently qualified for the discussion of fundamental life problems which he here undertakes. The book is avowedly an attack upon the more or less prevalent

view that plants and animals are mere aggregations of fundamentally independent elements. Whether these elements are considered as atoms, as simple chemical substances, or as living cells, they are insufficient to account for the unity of the organism as a whole. Part I is devoted to a critique of the elementalist conception of the organism. The author reviews the history of "elementalism" from Empedocles to the present day, attacks the Weismann view of the continuity of the germ plasm, discusses the chemistry of the organism, contends that there is no universal formula for protoplasmic structure, that we should speak of protoplasms rather than protoplasm, reviews the cell theory of organism and its short-comings, examines the nature and mechanism of heredity, sifts the evidence for and against chromatin as the physical basis of heredity, and arrives at the conclusion that the materials of germ cells are merely the initiators and not the determiners of the traits of the developing organism. In Part II the broader implications of the organismal conception are developed, growth integration is described, the functions of the nervous system in integration are emphasized, the significance of psychical integration in higher animals and man is discussed, and the work closes with a sketch of an organismal theory of consciousness. It will be seen, therefore, that the book makes an appeal not only to the biologist but to the psychologist and to the reader of general interests. It must be carefully considered by every thoughtful student of life phenomena.

SAMUEL D. ROBBINS. *A Plethysmographic Study of Shock and Stammering.* Reprinted from The American Journal of Physiology, Vol. 48, 1919. Pp. 285-330.

This experiment was undertaken to test the theory that stammering is accompanied by congestion of blood in the brain. It shows that both stammering and shock are characterized by marked vasoconstriction in the periphery (hand), and, therefore, tends to confirm the view that there is a corresponding dilation and congestion of the blood vessels of the head.

GEORGIE J. RUGER. *Psychological Tests: A Bibliography.* Supplement to January 1, 1918. New York: Bureau of Educational Experiments, 1918. Pp. 79-111.

This is supplement 1 to Bulletin No. 6, which is an earlier bibliography of Psychological tests. The numbers in the present bibliography are chiefly from the year 1917.

PETER SANDIFORD, Editor. *Comparative Education.* New York: E. P. Dutton and Company, 1918. Pp. x, 500. $4.00.

This interesting volume presents a comparative study of education in six representative countries of the world: The United States, Germany, France, Denmark, England and Canada. The collaborators in the work are Wm. F. Russell, Dean of the College of Education, State University of Iowa (United States); I. L. Kandel, Carnegie Foundation for the Advancement of Teaching (Germany); Arthur H. Hope, Headmaster of the Roan School for Boys, Greenwich, England (France); Harold W. Foght, United States Bureau of Education (Denmark); and the Editor, who is professor of education in the University of Toronto (England and Canada). From this array of educational specialists one expects and finds a clear, definite, comprehensive account of the main features of educational policy and procedure in the countries treated. In constitutes the most valuable survey of contemporary education to be found in a single volume.

JOHN THOMAS SIMPSON. *Hidden Treasures The Story of a Chore Boy who made the Old Farm Pay.* Philadelphia: J. B. Lippincott, 1919. Pp. 303.

A story of a boy who went from town to country and by inducing his uncle to adopt the methods of scientific farming started both the uncle and himself on the road to success. The tale is written with the purpose of portraying in attractive fashion the opportunities of life on the farm.

PARKE SCHOCH AND MURRAY GROSS. *Elements of Business.* Cincinnati: The American Book Company, 1918. Pp. 216.

There is an increasing demand for commercial training in high schools, and the fundamental principles of business are of importance for every intelligent boy or girl. The topics treated in this book are money and credit, banking, insurance, property, investments, letter writing, and personal account records. It is a stimulating and helpful little book.

J. B. SEARS. *Classroom Organization and Control.* Boston: Houghton Mifflin Company, 1918. Pp. xiii, 300. $1.75.

"The book is divided into four parts. In Part I the problem of school management is set forth. The broad social aim and character of education and of the school as an institution are emphasized, and the essential relationship between a clear aim and any trustworthy plan of action is explained. In Part II the discussion centers about the pupil as the object of management, showing how the school is to help the child to develop a real sense of membership in the group. This brings up questions of attendance, order and discipline, punishments, and incentives, with constant emphasis upon what the school can do for the individual child. Part III describes the machinery necessary for managing children in groups, and explains the process by which such means may be made effective in achieving the principal educational aims. Part IV undertakes to sketch out and to point the way toward the attainment of a set of standards in personality, professional development, health, and methods of work, for the teacher as the instrument by means of which society hopes to attain its educational aims." The author makes frequent reference to the results of educational measurements. There is a bibliography of fifty-six titles.

C. E. SEASHORE. *Manual of Instructions and Interpretations for Measures of Musical Talent.* New York: Columbia Gramophone Company, 1919. Pp. 16.

A book of directions for the use of the Columbia Gramophone Records in testing the musical abilities of school pupils. It is to be used in connection with Professor Seashore's *Psychology of Musical Talent,* and presents distribution curves for pitch, intensity, time, consonance, and tonal memory.

UPTON SINCLAIR. *The Profits of Religion.* Pasadena, Cal.: Published by the author, 1918. Pp. 315. Paper, $0.50.

The author states of this book "It is a study of Supernaturalism from a new point of view—as a source of income and a shield to privilege. I have searched the libraries through, and no one has done it before. If you read it you will see that it needed to be done.' If the author "searched the libraries through," there is certainly little evidence of his search in the pages of this book. In the midst of much wild lashing out at the institution of property, there are here and there shrewd observations on the toadyism of the church and the complacent neivete with which church people accept and endorse social inequalities.

DANIEL STARCH. *A Scale for Measuring Handwriting.* Reprinted from School and Society, Vol. IX, 1919. Pp. 9.

A critical examination of the Thorndike and the Ayres handwriting scales is followed by the description of a new scale of handwriting. Six hundred and twenty-seven samples were secured from elementary schools, high schools and business colleges in which some one of the widely current methods of business writing was taught. From these 227 samples were selected as representative and were ranked by each of eleven judges. From these 88 samples were again selected as most representative of the entire series, and were ranked by each of 100 judges. A scale was then constructed with equal steps from 1 to 20, based on the P. E. values of each sample, according to the method pursued by Thorndike. Instead, however, of comparing each sample with the next poorest, each

was compared with each of the five next poorer samples. This, according to the author, gives the scale a much greater reliability than that of Thorndike.

WILLIAM A. STECHER. *The Theory and Practice of Educational Gymnastics.* Philadelphia: John J. McVey, 1918. Pp. 145. $1.50.

This book is intended for use in Junior and Senior High Schools, and in boys' and girls' clubs. Part I sets forth the objects of physical training, the types of lessons, the aims of different groups of exercises, viewpoints underlying the selection of material for carrying out the different aims, and the principles of combining movements into free exercises. Part II gives the instruction material for three years' work in outline form and Part III presents assigned work arranged in the form of typical lessons. The book contains 33 illustrative figures, and promises to be a useful guide to teachers of educational gymnastics.

BERTHA STEVENS. *Private Commercial Schools of Manhattan and the Bronx.* New York: Public Education Association, 1918. Pp. 144.

This is the report of a committee to investigate private commercial schools in New York City. The survey found 67 such schools and grouped them into four types according to their equipment, teaching force and student body. Many of these schools are doing good work, but others offer their pupils little for their money. The committee recommends state registration and licensing, with state censorship of advertising materials used in soliciting pupils.

Surveys in Mental Deviation in Prisons, Public Schools and Orphanages in California. Sacramento: California State Board of Charities and Corrections, 1918. Pp. 87.

The monograph includes "A Partial Survey of the Prison Population of San Quentin, California, Based on Mental Tests of 155 Consecutive Entrants" by Lewis M. Terman and H. E. Knollin; "Backward and Feeble-Minded Children in the Public Schools of 'X' County, California," by Lewis M. Terman, Virgil Dickson and Lowry Howard; "The Intelligence of Orphan Children and Unwed Mothers in California Charitable Institutions," by J. Harold Williams; and "The Mental Examination of 75 Children at the 'Y' Home" by Grace M. Fernald. San Quentin shows a percentage of feeble-mindedness sixteen times as great as in the population at large. The average I. Q. of the orphans studied was 94, while that of the unwed mothers was 77.

C. W. SUTTON. *The Arithmetical Abilities of School Children as shown by Courtis Tests.* Cleveland: Division of Reference and Research, 1917. Pp. 15.

The report presents the results of the Courtis Tests given to grades IV to VIII in 36 schools. Cleveland is doing good work in the lower grades, but falls behind slightly in grades VII and VIII. The usual spread of abilities throughout the grades was noticed. Many fourth grade children surpass the median of the eighth grade, while many eighth grade children fall below the median of the fourth. The teacher is exhorted to watch the individuals of her class to see that the proper distribution of drill is given to bring each pupil up to a fair standard, but not to prolong this drill beyond a certain point for the brighter children.

LEWIS M. TERMAN. *Intelligence of School Children.* Boston: Houghton Mifflin Company, 1919. Pp. xxii, 317. $1.75.

This is an indispensable book for teachers who desire to be informed regarding the application of the results of tests of intelligence to school conditions. It is a companion book to the author's *The Measurement of Intelligence*, and is intended as an introduction to it. Professor Cubberley, the editor of the series, says, "A careful study of this book by the teachers of a city or state would contribute wonderfully to the intelligent handling of children, and the study of it

by prospective teachers would open up entirely new conceptions as to educational procedure, and would lead to a far more satisfactory direction of the exceptional children found in every school. The book will also prove of much value to parents interested in the education of their children, and especially to those whose children vary much in either direction from the normal." Chapter one discusses the principles of intelligence testing and develops the significance of the I. Q. Chapters two to six deal with individual differences in school children, with especial reference to the kindergarten, the first grade, the fifth grade, and the first year of the high school. The topics of other chapters are "The Mental Age Standard for Grading," "Mental Tests of School Laggards," "The I. Q. as a Basis for Prediction," "Some Facts about Fifty-nine Superior Children," "Case Studies of Forty-one Superior Children," "Intelligence Tests in Vocational and Educational Guidance," and "Practical Suggestions for the Use of Mental Tests." The last topic in the book deals with the value of group tests for the preliminary survey of a class or school, supplemented by individual tests of special cases. This is undoubtedly the direction in which intelligence testing is moving, and this interesting and readable discussion of the subject will do much to speed its progress.

LEWIS M. TERMAN. *An Experiment in Infant Education. Introductory Statement.* Reprinted from the Journal of Applied Psychology, Vol. II, 1918, 219-228.

This is a most interesting account of the way in which a father taught his two year old girl to read. The experiment was begun when the child had reached the age of nineteen months. Noting that she took great interest in pictures, the father presented the capital letters as pictures, maintaining interest at a high point by artificial devices. At twenty-one months the child had advanced to word pictures and real reading began. In the next five months her reading vocabulary increased to over seven hundred words, and she had read more than four school primers. The crucial point about the whole process was keeping interested attention at a high level all the time. The experiment contains many suggestions for a modification of procedure in the kindergarten. There is no reason why bright children might not be taught the elements of the school arts in the form of play at a very early age.

LEWIS M. TERMAN. *Tests of General Intelligence.* Reprinted from the Psychological Bulletin, Vol. 15, 1918. Pp. 160-167.

A discussion of the fundamental principles underlying mental testing, the unreliability of ordinary judgments of intelligence, and the superiority of the test method.

LEWIS M. TERMAN. *The Use of Intelligence Tests in the Army.* Reprinted from the Psychological Bulletin, Vol. 15, 1918. Pp. 177-187.

Selections from a text book prepared for use in the Student Army Training Corps. Discusses the significance of mental tests for military purposes, outlines the three systems of tests used in the war, presents the rating scale, and gives the results with 100,000 men.

LEWIS M. TERMAN AND MRS. MARY B. CHAMBERLAIN. *Twenty-three Serial Tests of Intelligence and their Intercorrelations.* Reprinted from the Journal of Applied Psychology, Vol. 2, 1918, Pp. 341-354.

The twenty-three tests are described and the table of intercorrelations given. The highest average correlation was obtained by mental age, the lowest by finding the shortest road between two points.

W. W. THEISEN. *A Report on the Use of Some Standard Tests.* Madison, Wis.: State Department of Public Instruction, Studies in Educational Measurements in Wisconsin, Bulletin No. 1, 1918. Pp. 120.

This valuable monograph is full of suggestions for the utilization of standard educational tests in the work of the classroom. It contains studies in spelling,

arithmetic, writing, composition and reading. In spelling three groups of twenty-five words each taken from the Ayres scale were given to pupils in grades III to VIII in 35 cities, 132 graded schools, and 1173 rural schools. The Wisconsin children are from one-half to a full year behind the Ayres standards. It is greatly to be regretted that the distributions of spellings on individual words was not indicated. In arithmetic the Woody Tests, Series A, were given to over 7,000 pupils in grades III to VIII in 21 cities. There is a very interesting analysis of ten troublesome examples. In handwriting the relation of speed and quality was examined on the basis of the Thorndike scale, compositions were scored by the Hillegas scale, and reading was evaluated by the Kansas Silent Reading Tests. Each chapter closes with a list of selected references on measurements in that field and on methods of teaching the subject.

L. L. THURSTONE. *The Anticipatory Aspect of Consciousness.* Reprinted from the Journal of Philosophy, Psychology and Scientific Methods, Vol. 16, 1919, Pp. 561-568.

An analysis of concepts in terms of unfinished acts. "The concept and the idea are differentiated by the fact that the concept is the ideomotor antecedent of the idea, and that the transition involves the process of making the concept stage of the circuit sufficiently particularized to be personally concrete."

L. L. THURSTONE. *The Learning Curve Equation.* Psychological Monographs, No. 114, 1919. Pp. 51. $0.75.

This is an account of the derivation and application of various mathematical formulae to the learning process as exemplified typewriting practice.

HERBERT A. TOOPS AND RUDOLF PINTNER. *Variability of the Education of Unemployed men.* Reprinted from the Journal of Applied Psychology, Vol. II, 1918. Pp. 207-218.

The median school grade of over 16,000 men applying for employment at the Dayton State-City Free Employment Office during the years 1916-1917 was approximately 8.30, or slightly above the eighth grade. The range extended from those with no schooling whatever to college graduates. The article gives extended tables of distribution by months and by seasons.

C. W. VALENTINE. *The Experimental Psychology of Beauty.* Edinburgh: Thomas Nelson and Sons, 1919. Pp. 128. 1 s. 3d.

A valuable summary of British experiments in the psychology of color, form, symmetry, pictorial appreciation, musical intervals and rhythm. The experiments of Miss Puffer are the only American investigations referred to, and curiously enough no mention is made of Seashore's extensive studies in music.

MARVIN J. VAN WAGENEN. *An Investigation into the Amount of Improvement in Ability to Write English Composition.* Bulletin of the University of Minnesota, Vol. 22, No. 5, 1919. Pp. 18.

This bulletin reports the attempt to measure the improvement in English Composition as a result of 12 weeks' practice in regular high school composition work. Four sets of twelve topics each were compiled and sent to the members of the Minnesota English Teachers' Association. Nearly 100 teachers cooperated in the experiment, and the compositions were graded by the Harvard-Newton scales and checked by the Thorndike extension of the Hillegas scale. Detailed tables of scores are given. The net result of the experiment was that "the amount of gain to be derived from 12 weeks' practice in theme writing is very small, too small to be measured with any degree of accuracy from the numbers taking part in this investigation."

J. E. WALLACE WALLIN. *The Value of the Intelligence Quotient for Individual Diagnosis.* Reprinted from the Journal of Delinquency, Vol 4, 1919. Pp. 109-124.

A historical and critical consideration of the I. Q. and a discussion of its validity on the basis of the study of 411 cases in St. Louis. The author contends that the I. Q. tends to diminish with chronological age, and that, therefore, it means different things at different ages. Thus the I. Q. exaggerates the mental retardation of youths and adults as compared with children. Follow-up studies of adolescent cases support the view that individuals rated as imbecile by the I. Q. are able to support themselves in society, and should not be rated lower than backward.

HOWARD C. WARREN. *Human Psychology.* Boston: Houghton Mifflin Company, 1919. Pp. xx, 460. $2.75.

This book is packed full of good things. In breadth of view, in sanity of balance, in the inclusion and proper evaluation of biological, neurological and purely mental factors, in the choice of illustrative diagrams, in clearness of statement, and in sympathetic interpretation of the higher thought processes it represents a distinct advance over previous texts. The author's general point of view is behavioristic, without excluding the conscious responses which play such an important role in our adjustments to life situations. He defines psychology as "the science which deals with the mutual interrelation between an organism and its environment." Recognizing, therefore, that physical structure is an essential feature of this interrelation, he does not refer the student to physiology and neurology for the study of this structure, but proceeds at once to a clear and concise description of the elements of organic structure. The conception of the nervous arc is well worked out, and the neurological terms of receptors, connectors and effectors are freely and consistently used. There is an excellent brief discussion of reflexes, and while instincts are said to depend on inherited structure, it is recognized that they are the result of integration and co-ordination of nerve impulses, and that human beings have practically no pure instinctive activities unmodified by habit formation. While the educational psychologist will find the learning process treated too briefly, and the general patterns of conscious response perhaps too broadly, the teacher of general introductory psychology with college classes will welcome the book as a discriminating selection of the essential results of modern psychological investigation.

HANOR A. WEBB. *Chemistry, A Trade or a Profession?* Reprinted from the Scientific Monthly, December, 1918. Pp. 530-534.

The high school graduate who has specialized in chemistry and who desires to go into industry finds that he has not had enough training to be called a chemist, nor enough experience to command any advantage as a workman. There is little encouragement, therefore, to try to make high school chemistry articulate with industry.

CARL J. WEST. *Introduction to Mathematical Statistics.* Columbus: R. G. Adams and Company, 1918. Pp. 150.

This book is designed for those who have no further knowledge of mathematics than elementary arithmetic, and presents in simple, lucid fashion the theory of statistics. It deals with curve plotting, frequency curves, averages, forms of distribution, the normal probability curve, correlation tables and ratios, rank correlation, coefficient of correlation, moments of a distribution, and the method of contingency. The book is printed on heavy glazed paper, and is well gotten up.

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